RADIOLOGICAL ASSESSMENT OF CHRONIC LOW BACKACHE

THESIS

FOR

DOCTOR OF MEDICINE

(RADIO-DIAGNOSIS)

BUNDELKHAND UNIVERSITY
JHANSI (U. P.)

1991

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CERTIFICATE

This is to certify that the work entitled "RADIOLOGICAL ASSESSMENT OF CHRONIC LOW BACKACHE", which is being submitted by Dr. SURESH KUMAR SRIVASTAVA, as a thesis for M.D.(Radio-diagnosis) examination, was carried out in the Department of Radiology, M.L.B.Medical College, Jhansi.

He has put in the necessary stay in this Department as required by the regulations of Bundelkhand University, Jhansi.

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CERTIFICATE

This is to certify that the work entitled "RADIOLOGICAL ASSESSMENT OF CHRONIC LOW BACKACHE", which is being submitted by Dr. SURESH KUMAR SRIVASTAVA, as a thesis for M.D.(Radio-diagnosis) examination, was carried out under our personal supervision and guidance. The examination of patients was done by the candidate himself and the observation recorded have been checked by us from time to time.

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ACKNOWLEDGEMENTS

Words, in fact, cannot substitute for the feeling of gratitude, that I have towards all who have helped me in the formation of this project.

It is with a profound sense of gratitude that I pay my obeisance, to my esteemed and exalted Guide and teacher, Dr. A.K. Gupta, M.D., Reader in the Department of Radiology, M.L.B. Medical College, Jhansi, who with his unfathomed knowledge and experience, canny precision and untiring zest for work, guided me unflinchingly throughout this humble venture. His firm initiative, timely and constructive criticism, invaluable guidance, divine inspiration and above all a benevolent attitude, went a long way towards the completion of the present task. His painstaking efforts to mould this work into a fine illustrated shape, will always remain as an unforgettable memory in my heart.

I must express my deepest gratitude to my revered teacher, Dr. D.K. Gupta, M.S., Lecturer in the Department of Orthopaedics, M.L.B. Medical College, Jhansi, for his excellent guidance, supervision and unlimited help at every juncture. His constructive and meticulous suggestions have gone a long way in the accomplishment of this project.

Dr. M.N. Saxena, M.D., D.M.R.E., Professor and Head, Department of Radiology, M.L.B. Medical College, Jhansi, was a continuous source of unparalleled inspiration and encouragement, by his profound knowledge and vast experience and I shall remain indebted to him throughout my life.

For Dr. T.B.L. Jaiswal, M.D.,D.M.R.E., Reader, and Dr. G. Kumar, M.D., Lecturer, Department of Radiology, M.L.B. Medical College, Jhansi, I have the deepest respect and a sense of perpetual indebtness. They were a source of unlimited help and profound knowledge.

I deeply value and admire the generous help extended to me by my colleagues, with special thanks to Dr. R.K. Goyal, who were a constant source of encouragement, throughout the work.

At this moment of glory and award, I humbly accept that all credit actually goes to my brother and my wife. Their affection, sacrifices and patience have made all this worthwhile. I would like to mention a deep sense of appreciation to my respected mother. My little daughter have also been very co-operative during the period as she missed me most during this period.

I owe a deep debt of gratitude to the patients, who submitted themselves for the detailed examination and to all those who took simultaneous pains with me, without

whose co-operation, the present study could not be made a success. I shall be thankful to them for ever.

Last but not the least, to Mr. K.M. Thomas, I shall ever remain thankful for his skilled, neat and faultless typing.

I dedicate this work to the love, understanding and patience of my mother, brother, wife and my daughter Deepakshi, which was sustained me throughout.

Dated: 23 Oct. 1990

(SURESH KUMAR SRIVASTAVA)

C O N T E N T S

INTRODUCTION

INTRODUCTION

Pain may be defined as an emotional response to afferent input. The word itself comes from the same root as penalty, something that must be paid. In setting out to develop an appreciation of the experience, it is helpful to begin with a consideration of the influence of language upon our comprehension.

It is likely that low back pain has plagued humankind since its beginning. In the Huang Ti Nei Ching Su Wen, or The Yellow Emperor's classic of Internal Medicine (written between the 18th & 5th centuries BC), which remains a standard work in traditional Chinese medicine, there is reference to the diagnosis and therapy with acupuncture and moxibustion, for pain in the lumbar region (Veith, 1972). Chin (1977) reported that he treated back pain successfully by using Acupressure points, according to the compendium of Acupuncture and Moxibustion written by Yand during the Chinese Ming dynasty in 1501. Reference to the diagnosis and therapy of back pain is found in the papyri of ancient Egypt; the worker of Hippocrates and Galen and through the Middle ages and Renaissance. Hirsch (1866) pointed out that in the Middle Ages, many of the pains ascribed to rheumatism were considered to be referred from painful lesions of the spinal joints.

All too often the patient presenting to a physician with a complaint of low back pain, with or without radiation to the leg, is referred immediately for an X-ray of the lumbar spine as part of a "routine work-up". The inter-vertebral disc undoubtedly represents the major pivotal element of the spine, but it would be wrong to consider it purely in isolation. Schmorl and Junghanns used the term 'motor segment' to embrace such structures as the annulus fibrosus, inter-vertebral ligaments, apophyseal joints, capsules, dura and paraspinal muscles. The purpose of radiology is to demonstrate in the most definitive manner abnormalities of structures and function in the motor segment with the minimum of radiation and upset to the patient.

The role of radiology in the evaluation of low back and leg pain needs to be accurately defined. Some workers found that only lumbar phlebography was more accurate than the clinical examination (Epstein et al, 1972). However, in the presence of a positive clinical examination, early plain film examination would appear to be indicated (Mac Nab, 1978).

From the foregoing it can be seen that the main function of plain X-ray is to exclude serious diseases such as infection, neoplasm or fracture. Evidence of disc degeneration radiologically does not necessarily

indicate that this is the cause of patients symptoms and signs. Treatment should be determined primarily by clinical assessment and not on the radiological findings.

The radiological examination is the most important and basic tool of investigation in chronic back pain cases. Most of the causative factors such as disc prolapse, spondylolisthesis, arthritis, inflammatory conditions and congenital anamolic condition can very well diagnosed by this investigation. In some cases, contrast visualisation of subarachnoid space of spinal canal is necessary so that exact localisation of cause can be confirmed by myelographic technique. Principally two scout radiological examination shall be required. Antero-posterior, lateral and in few cases oblique views for pars inter-articularis, neural foramina.

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REVIEW OF LITERATURE

1. ANATOMY OF LUMBO-SACRAL SPINE

2. PHYSIOLOGY OF PAIN AND BACK PAIN

3. CAUSES OF BACK PAIN (LITERATURE REVIEW).

ANATOMY OF LUMBO-SACRAL SPINE

REVIEW OF LITERATURE

1. ANATOMY OF THE LUMBAR AND SACRAL SPINE :

The human spine is comprised of 7 cervical, 12 dorsal and 5 lumber vertebrae. The sacrum consists of 5 segments and the coccyx with 4 or 5 segments. Counting the sacro-iliac joints, the posterior inter-vertebral joints and the costo-vertebral joints, there are 97 diarthroses, each with its capsule and synovial system. All are paired, except the joint between the atlas and the dens.

Lumbar Vertebrae :

The lumber vertebrae are heaviest and are readily distinguished from the others by their distinctive size. The bodies are wider from side to side than from before backward, and are a little thicker in front. The pedicles are directed backward from the upper part of the vertebral body, so that the inferior vertebral notches are deep. The pedicles and laminae are dense and strong. The vertebral foramina are more variable, becoming triangular in configuration. They are larger than the thoracic but smaller than the cervical foramina. The spinous processes are thick, broad, somewhat quadrilateral, project downward and backward ending in rough uneven borders which sometimes are notched. The superior and inferior articular

processes of the neural arches project upward and downward respectively from the functions of the pedicles and laminae. The transverse processes vary; the first, second and fourth being somewhat shorter than the third. The fifth transverse processes are variable. In the first, second and third lumbar vertebrae, the transverse processes arise from the functions of pedicles and laminae, but in the fourth and fifth lumbar vertebrae they are set forward and originate from the pedicles and posterior portions of the bodies.

Congenital variations in the configuration and dimensions of the lumbar spinal foramina are frequent. Congenital narrowing of the canal carries with it the possibility of aggravated effects of ridges, spurs and discal extrusions. The dimensions of the spinal canal increase rapidly from birth upto 5 years and then more slowly between 6 and 10 years. The canal is fully formed when the neuro-central synchondroses fuse, during the third to tenth years. The growth of the vertebral arches determines the development of the canal, as does the horizontal growth of the body with its consequent effect on the size and position of the pedicles.

The fifth lumbar vertebrae is subject to many structural variations. The most common is one in which the body is deeper in front than behind. Its transverse processes, as a rule, are heavier than those of the

supra-acent vertebrae, and normally present rather bulbous tips which do not articulate with the sacrum of iliac bones. The articular facets between L_5 and S_1 are variable. Vertical placement of the facets seen between L_2, L_3 and L_4 is quite uncommon in the lumbosacral region. In many these articular facets are coronally placed, while in others they are obliquely situated. Asymmetry between the right and left facets is not uncommon. The clinical significance of variations in the apophyseal joints between the L_4, L_5 and S_1 vertebrae is doubtful.

The neural arch of L_5 is subject to congenital variations, with much discussion about the significance of its incomplete fusion. Less often similar changes occur in the fourth and to a lesser degree in the neural arches of the other vertebrae, similarly of doubtful significance unless accompanied by other structural changes.

Sacrum :

The normal sacrum composed of 5 fused bodies is wedge-shaped, tilted dorsally with its apex directed downwards, and is convex posteriorly. Dorsal tilting is greater in females. Occasionally, the first sacral segment is incompletely fused, referred to as lumbarization. In other instances fusion of the body of L_5 with the sacrum gives rise to 6 sacral segments, designated as sacralization

of the fifth lumbar vertebra. These are regarded as transectional vertebrae. To either side of the midline dorsally and ventrally are paired sacral foramina. Between them transverse lines separate the bodies. These are not visible on the dorsal aspect of the sacrum, and appear on lateral studies only on the anterior surface. As a rule, 4 sacral spinous processes are identified. Beneath the distal arc and between the fourth anterior sacral foramina are the invested U-shaped sacral cornua between which is the sacral hiatus. The 4 anterior sacral foramina are irregularly circular in configuration, and their dorsal openings are somewhat smaller. They diminish in size from above downward. Beneath the fourth sacral foramen a notch corresponding to the fifth sacral foramen is sometimes present.

Apophyseal Joints :

The spinal apophyseal joints are true arthrodial articulations with articular cartilage and synovial linings, enveloped in loose articular capsules. The lumbar facets are heavier, rotate backwards to an angle of about 45 degrees, and present somewhat cylindrically curved articular surfaces.

Lumbar rotation is limited to about 5 degrees, and flexion and extension are facilitated by the sagittal alignment of the apophyseal joints. The lumbosacral joint

permits some rotary motion. The alignment and positioning of the articular surfaces and the range of motion are variable. The stress on the lumbosacral joint is greater than on those above, so that the pedicles laminae and transverse processes of the fifth lumbar vertebrae are heavier.

Inter-vertebral disc :

Twenty three inter-vertebral discs unite the bodies from the second cervical to the first sacral vertebrae inclusive, forming a series of amphi-arthrodial or slightly movable, joints. In adults the inter-vertebral discs are avascular and composed of a surrounding annulus fibrosus of fibrocartilage enclosing the nucleus pulposus. The size correspond to those of the intervening vertebrae. The configuration of the inter-vertebral discs influences the alignment of the vertebral column. In the lumbar region the discs affect the lumbar lordotic curve, being considerably heavier anteriorly, especially at the lumbo-sacral articulation.

Measurements of intradiscal pressures in the lower lumbar spine by Nachemson and Morris (1964) ranged from 10 to 15 kg/cm^2 in seated patients. In the standing position the pressures were about 30 percent less, and about 50 percent less in the reclining position. It was found that

the lower lumbar discs support loads of as much as 100 to 175 kg when the subject is seated, but only 90 to 120 kg when erect. They regarded their data as helping to explain relief of pain when standing or reclining, the pain which occurs during the Valsalva manauver, and the biconvex vertebra appearance of osteoporotic spines with relatively normal or bulging discs.

Spinal ligaments :

Flexion is checked by supra-spinous, inter-spinous and inter-laminal ligaments which binds the adjacent vertebrae together posteriorly. This is aided to some extent by the ligamenta flava which differ from other ligaments in that they contain elastic fibres. The anterior longitudinal ligament is a heavy, broad band extending from the axis to the sacrum along the ventral aspect of the vertebrae. The posterior spinal ligament within the spinal canal extends from the body of the axis to the sacrum.

Muscles :

Posteriorly the short and long inter-vertebral muscles are attached to the posterior and lateral processes. The vertebral-costal, vertebral-iliac and vertebral-sacral groups produce extension of the back, and with other co-ordinated groups, rotation and lateral bending. Flexion of the back is produced by contraction of the psoas muscles

when the thighs are fixed by the anterior and lateral abdominal muscles acting through the levers of the thoracic cage and pelvis, and by the anterior neck muscles.

Inter-vertebral Foramina :

Inter-vertebral foramina are oval in shape, bounded anteriorly by vertebral bodies and inter-vertebral discs. Above and below are the pedicles. The posterior margins are formed by the superior and inferior articular facets and the ligamentum flavum.

Development of the Vertebrae :

1. In the first days of intra-uterine existence, a dorsal groove appears on the surface of the embryo-neural groove.

2. The neural groove becomes closed off forming the neural canal. From the walls of this canal, the entire central nervous system is developed. Its lumen persists as the central canal (spinal).

3. The neural canal becomes separated from the ectodermal covering of the body by an ingrowth of the mesoderm.

4. Anterior to the neural canal is a solid rod of cells, the notochord.

5. Round the notochord, the vertebral bodies develop.

6. From each of the bodies there extend two projections which grow round the neural canal to form the vertebral arch.

7. The two halves of the arch fuse first in the thoracic region. From there fusion extends up and down.

8. Failure of fusion i.e. incompleteness of the vertebral arch, constitutes spina bifida.

Blood supply of vertebrae : (Fig. 1)

Body :- i) Two large vessels enter the body from behind.

ii) Smaller vessels enter the body from in front.

iii) A. Vessels enters at the root of the transverse process and sends branches to lamina, pedicle, spina and transverse process.

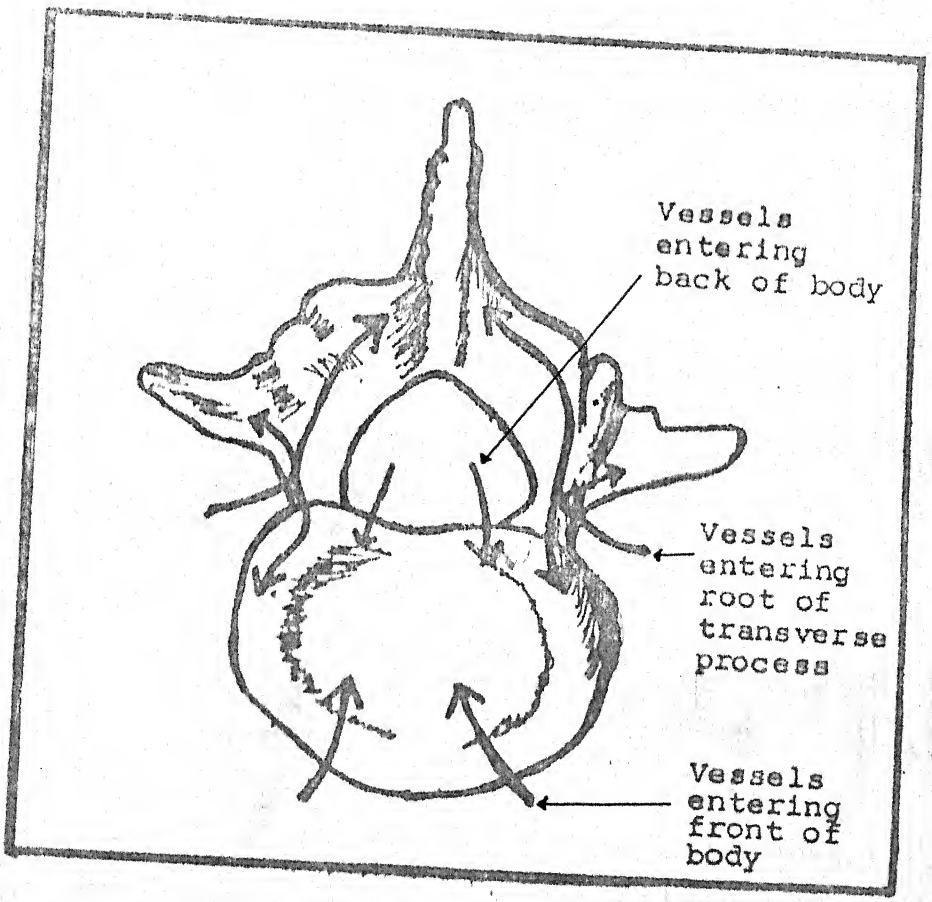

Fig. - 1 : Blood Supply of Vertebrae.

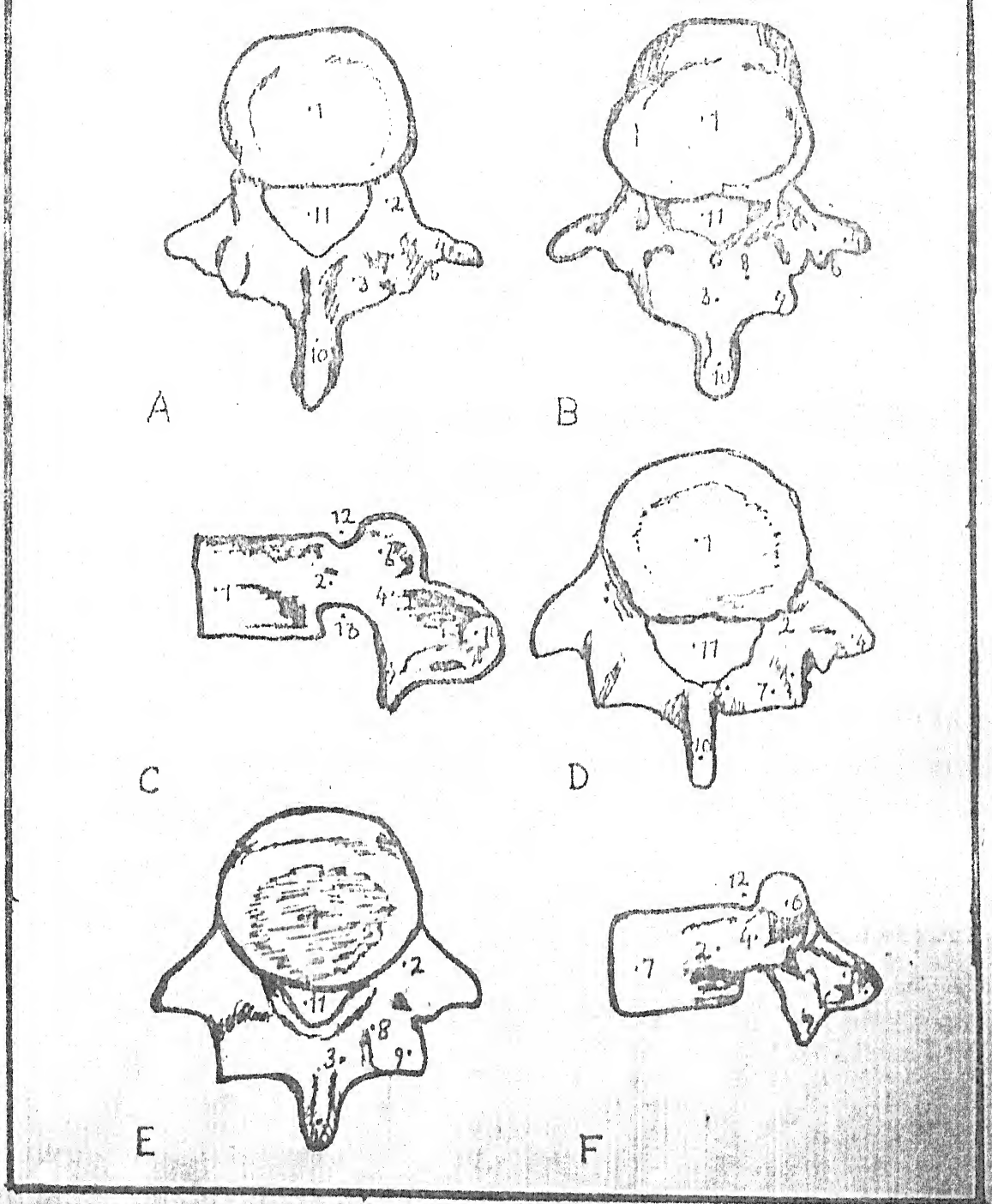

Fig. - 2 : Lumbar vertebrae, that illustrate their anatomic details.

3rd lumbar vertebra : A, superior aspect,
B, inferior aspect,
C, lateral aspect.

5th lumbar vertebra : D, superior aspect,
E, inferior aspect,
F, lateral aspect.

LEGEND FOR FIGURE - 2

1. Body of vertebra (corpus vertebrae)
2. Root (pedicle) of vertebral arch (radix arcus vertebrae)
3. Lamina of vertebral arch (lamina arcus vertebrae)
4. Transverse process (processus transversus)
5. Accessory process (processus accessorius)
6. Superior articular process (processus articularis superior)
7. Superior articular facet (facies articularis superior)
8. Inferior articular process (processus articularis inferior)
9. Inferior articular facet (facies articularis inferior)
10. Spinous process (processus spinosus)
11. Vertebral foramen (foramen vertebral)
12. Superior vertebral notch (incisura vertebralis superior)
13. Inferior vertebral notch (incisura vertebralis inferior).

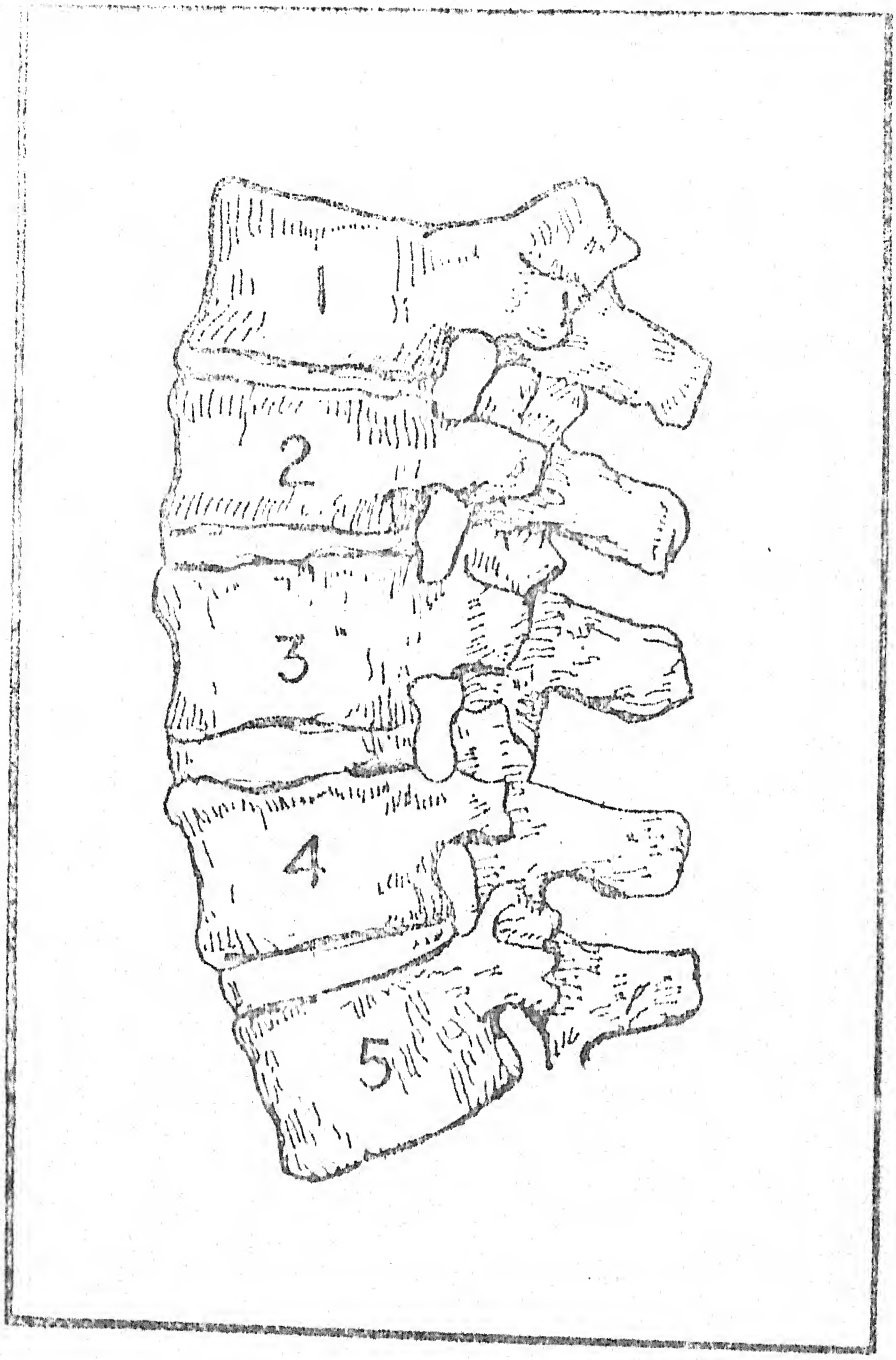

Fig. - 3 : The normal lumbar spine with its lordotic curve.

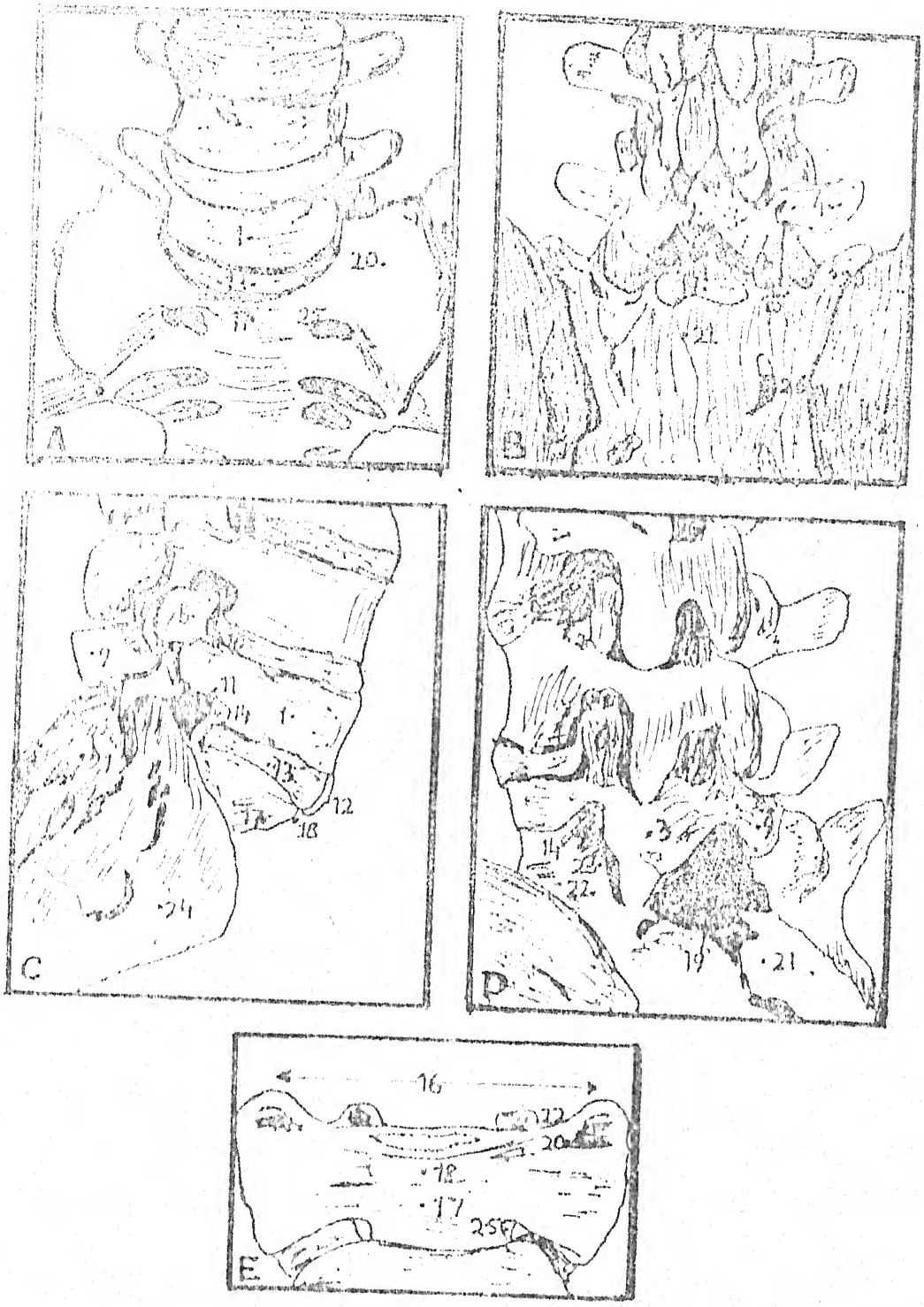

Fig. - 4 : Articulated lumbar vertebrae and sacrum, illustrating the anatomy of these structures and the lumbosacral junction.

A, anterior aspect; B, posterior aspect;
C, lateral aspect; D, lateroposterior aspect;
E, anterior aspect of superior portion of sacrum.

LEGEND FOR FIGURE - 4

5th LUMBAR VERTEBRA

1. Body of vertebra (corpus vertebrae)
2. Root of vertebral arch (radix arcus vertebrae)
3. Lamina of vertebral arch (lamina arcus vertebrae)
4. Transverse process (processus transversus)
5. Superior articular process (processus articularis superior)
6. Superior articular facet (facies articularis superior)
7. Inferior articular process (processus articularis inferior)
8. Inferior articular facet (facies articularis inferior)
9. Spinous process (processus spinosus)
10. Superior vertebral notch (incisura vertebralis superior)
11. Inferior vertebral notch (incisura vertebralis inferior)

LUMBOSACRAL JUNCTION

12. Articulation for the vertebral bodies (bracket is used in illustration to indicate articulation)
13. Inter vertebral disc (space)
14. Inter vertebral foramen (foramen inter vertebrale)
15. Articulation for the vertebral arches (bracket is used in illustration to indicate articulation)

1st SACRAL VERTEBRA

16. Base (basis ossis sacri)
17. Body of vertebra (corpus vertebrae)
18. Promontory (promontorium)
19. Sacral canal (canalis sacralis)
20. Lateral mass (pars lateralis)
21. Spinous process (processus spinosus)
22. Superior articular process (processus articularis superior)
23. Superior articular facet (facies articularis superior)
24. Iliac articular surface (facies auricularis)
25. Anterior sacral foramen (foramen sacralis anterior)
26. Posterior sacral foramen (foramen sacralis posterior).

PHYSIOLOGY OF PAIN AND BACK PAIN

2. PHYSIOLOGY OF PAIN AND BACK PAIN :

Pain :

Pain is the symptom for which most patients seek medical assistance. Since only the sufferer and not the observer perceives pain, it can have no precise definition. Sir Thomas Lewis described the situation exactly when he said that pain is "known to us by experiences and described by illustration". Webster defines pain as the "sensation one feels when hurt mentally or physically; especially distress, suffering, great anxiety, anguish, grief, etc. as opposed to pleasure - or, a sensation of hurting or strong discomfort in some part of the body caused by an injury, disease, or functional disorder and transmitted through the nervous system".

Three theories have been advanced to explain the physiology of pain, the first, the Doctrine of specific Nerve Energies, by Muller in 1930, envisioned a specific system of receptors and fibers which respond to pain only and are different from other receptors and fibers which respond to other specific sensory modalities. A second theory, the Pattern Theory, by Noff in 1927, suggested that any given fiber and pathways could subserve any modality and that perception of pain depends on the temporal and spatial pattern of impulses which the stimulus produced. A third concept, the Duplex Theory by Henry Head in 1920,

suggested two interacting sensory system, one composed of slowly conducting small fibers which subserve pain and the extremes of temperature and another of large, more rapidly conducting fibers which subserve light touch; localisation and temperature discrimination. 'Head' called these two systems protopathic and epicritic.

In the peripheral nerves the stimulus that leads to pain is carried by two types of small fibers. Fast pain a sensation of short latency and short duration usually percieved as pricking or sharp, is mediated by delta fibers (the smallest myelinated fibers) which are 1 to 6 μ in diameter. Slow pain with a larger latency and duration is perceived as the poorly localized burning exceedingly unpleasant sensation and is mediated by small unmyelinated C fibers which are 0.4 to 1.2 μ in diameter. Both sets of fibers have their cell bodies in the dorsal root ganglia and enter the spinal cord through the dorsal root into Lissauer's tract. They synapse in the substantia gelatinosa or in the posterior horn of the spinal cord. After synapsing, the delta fibers pass through anterior white commissure to reach the lateral spinothalamic (neospinothalamic) tract contra-laterally and ascend to the thalamus. Postsynaptic C fibers also cross the spinal cord in the anterior white commissure to reach the anterior spinothalamic (Paleo spinothalamic) tract. These neurons also ascend to the thalamus but along the way give rise to a large number

of collaterals to the reticular formation of the brain stem and hypothalamus. The neospinothalamic tract terminates in the ventrobasal complex of the thalamus and the paleo-spinothalamic tract in the intra-laminal and perifascicular nuclei of the thalamus. The ventrobasal thalamus also receives fibers from the dorsal column - medial lemniscal system (subserving the modalities of touch, position and vibratory sensation) and projects to two areas of the cerebral cortex; somatosensory area 1 (which in man is part of the sensorimotor cortex surrounding the Rolandic fissure) and somatosensory area 2 in the parietal operculum. The thalamic intra-laminar and para-fascicular nuclei (paleo-spinothalamic tract) project diffusely to the cortex and are considered to be part of the reticular activating system of the brain stem.

Back Pain :

Back pain is a symptom description that includes two main components although these are not necessarily mutually exclusive. First, there is pain that is experienced or perceived on the dorsal surface of the body and area that extends from the occiput to the gluteal folds and outwards to the lateral margins of the neck and trunk. Secondly, there is pain that is presumed to arise from dorsal structures, particularly the vertebral column and its related tissues; this extends the concept to embrace a

variety of complaints referred to the shoulder region and the leg. The inter-vertebral disc undoubtedly represents the major pivotal element of the spine, but it would be wrong to consider it purely in isolation. Schmorl and Junghanns (1971) used the term "motor segment" to embrace such structures as the anulus fibrosus, inter-vertebral ligaments, apophyseal joints, capsules, dura and paraspinal muscles.

Each inter-vertebral disc consists of fibro-cartilage and has a soft center, the nucleus pulposus, surrounded by thicker fibrous tissue, the anulus fibrosus. The nucleus pulposus constitutes most of the disc substance in the young, but with age it loses volume and resilience. When, during effort or trauma, the disc is suddenly compressed and the nucleus pulposus is caused to protrude through the anulus, fragments of disc may be extruded into the spinal canal. The herniated disc is usually directed towards the spinal canal because the anulus and longitudinal ligament are thinner posteriorly. Disc disease is more common in the cervical and lumber spine where there is greater mobility; on the thoracic spine, where movement is limited, disc herniation are rare. Pain is the main symptom of an inter-vertebral disc protrusion. It is usually severe and accompanied by local reflex contraction of paraspinal muscle.

There are numerous causes of low back pain, firstly which originate from musculo-skeletal system and secondly which originate from non-musculo-skeletal system like dissecting and rupturing aortic anurysms, intra-abdominal neoplasms (both malignant and benign), intra-abdominal disease processes such as ruptured gastric or duodenal ulcers and hemorrhagic pancreatitis, all can produce low back pain. The musculo-skeletal origin back pain are like as lumbo-sacral strain, herniated lumber disc, degenerative arthritis, spondylolisthesis, inflammatory spondylitis, disc space infection, vertebral osteomyelitis, spinal tuberculosis, metabolic bone disease and spinal tumors.

The purpose of radiology is to demonstrate in the most definitive manner abnormalities of structures and function in the motor segment with the minimum of radiation and upset to the patient. The role of radiology in the evaluation, of low back and leg pain needs to be accurately defined.

From the foregoing, it can be seen that the main function of plain X-ray is to exclude serious diseases such as Infection, Neoplasm or fracture. Evidence of disc degeneration radiologically does not necessarily indicate that this is the cause of patients symptoms and signs. Treatment should be determined primarily by clinical assessment and not on the radiological findings.

CAUSES OF BACK PAIN (LITERATURE REVIEW)

3. CAUSES OF LOW BACK PAIN (Literature Review) :

Developmental Anomalies :

Southworth and Bereaek (1950) reported that 550 patients with anomalies of the lumbosacral vertebrae, most had little or no symptoms referable to the low back. Spina bifida occulta was present in 10.2 percent; 2.2 percent of these occurred in the lumbar spine and 16.0 percent involved the sacrum. Of the lumbar defects, only one was to the left of the midline, of the sacral defects 3 were to the right, 2 to the left of the midline, and 1 bilateral. All others were central in location.

Dittrich (1938) reported that 5 percent of all spines examined roentgenologically presented spina bifida occulta.

Brock, Hillsman and Bacon (1944) reported an incidence of 6 percent in a series of 450 cases. However, Friedman, Fischer and Van Demark (1946) reported an incidence of 36 cases of spina bifida occulta in 100 soldiers. It is not infrequent during gastro-intestinal or genito-urinary examinations to encounter a symptomless cleft spinous process of the fifth lumbar or first sacral segments together with atypical formation of the lowermost articular processes.

Jelsma and Fleetner (1953) reported 18 patients with spina bifida occulta and low back pain radiating to the hips, and sometimes to one or both legs. While pain was sometimes recurrent, it often was continuous over a period of years and could be aggravated by bending. Usually no reflex or sensory changes were noted. Operation disclosed a mass of fibrous or fibro-lipomatous tissue, often with a constricting mass of fibrous tissue involving the dura. At times fibrosis involving the sheaths of the emerging nerve roots was encountered. They did not observe cord involvement by traction on the filum terminale. None of their cases showed evidence of myelodysplasia, and the bony defects were minimal. Apparently the pain was produced by a traction mechanism in which the dense fibrous tissue extended from the dura to an insertion where the posterior spinous processes ordinarily would have appeared and there the fibrous bands become attached to the lumbar fascia of the back.

Meningoceles occur most frequently in the lumbar and lumbosacral regions. Cervical and thoracic meningoceles are less frequent, and high cervical occipital meningoceles were less common. In a series of 385 cases reported by Moore (1905), 23.0 percent were sacral, 34.0 percent lumbar, 29.0 percent lumbosacral, 4.5 percent thoracic, 9.5 percent cervical and 2 patients had occipital meningoceles. Rarely para-vertebral lumbar meningoceles associated with hemi-

vertebrae appear as cystic swellings, with other anomalies of the neural arches.

Spinal curvatures :

The notion, that pathology of various vertebral column structures as the prevalent cause of low back pain, was challenged by Kraus (1970) who studied 5000 patients in two New York hospitals, presenting with low back pain. He concluded that in 80 percent, the pain was due to muscular dysfunction, while only 20 percent showed conclusive evidence of vertebral or disc pathology. In the 1940s, the importance of various myofascial syndrome as trigger areas causing pain in the low back was emphasized by Travell (1949) and Sola (1956).

Epstein et al (1976) reported the presence of severe low back and radicular pain with scoliosis is not adequately recognized. They had encountered a group of elderly patients with severe curves, usually convex to the right side, in whom symptoms had progressed to the point of complete incapacitation, and who had no relief from conventional therapy. One had had a surgical procedure for a herniated disc with minimal relief and rapid recurrence of symptoms. In review of myelograms with scoliosis without symptoms, it was noted that the cord was pulled towards the concavity of the curve, so that the lateral gutters on the convex side were wider than on the concave side. In several

patients with severe low back pain and sciatica marked impingement into the canal was observed myelographically, so that a partial block existed in some, and in others indentations into the column at the concavity indicated pressure against the emerging roots. At operation, it was found that stenosis of the lateral angles of the affected vertebrae complicated by thickening of the laminae and constriction of the inter-vertebral foramina and scarring of the nerve roots were present. In these patients relief was achieved after adequate laminectomy and foraminotomy, even in patients who had been bedridden and in severe pain for months.

Fahrni (1975) in discussion of conservative treatment of lumbar disc degeneration, promoted the idea of using posture correction in treatment. He presented data to show that the erect posture used most of the day in western societies places a strain on the lumbar lordotic curve. This posture is conducive to a progressive incidence of disc degeneration and consequent low back pain. X-ray studies revealed that the incidence of disc narrowing was 80 percent by age 55 among Swedish heavy labourers, 35 percent by the same age in office workers, while in a jungle population in India, the incidence at the same age was 9 percent.

Inflammatory and Granulomatous origin of spinal disease :

Interesting manifestation of ankylosing spondylitis noted by Mathews (1968). He noted an unduly capacious canal in 2 cases, and found that the bone was eroded by numerous diverticula which extended deeply into the lamina and spinous processes as well as into the roof of the canal, particularly at the lowermost 3 lumbar levels. In some of these, a cauda equina syndrome was produced because of firm grey connective tissue surrounding the cauda equina, with perivascular lymphocytic infiltration. In other patients the dilated sac and diverticula were entirely asymptomatic. Others may have leg and buttock pain, and impairment of bladder and bowel function (Russel et al, 1973). Incontinence, nocturia and anaesthesia of the buttocks and thighs were noted by Rosenkrantz (1971) in a patient with longstanding ankylosing spondylitis with multiple arachnoidal cysts and large bone erosions involving the lumbar spine.

Killebrew et al (1973) observed psoriatic spondylitis in 10 to 36 percent of patients, with high incidence of bilateral sacroiliitis, coarse asymetric, heavy syndesmophytes and para-vertebral ossification.

The incidence of spinal tuberculosis was reported by Bosworth and Levine (1949) to be 3.2 percent of a total of 12,835 tuberculous patients during the period 1940 and 1945 inclusive. This lowered incidence was related to improved treatment.

A case of isolated tuberculosis of the spinous process of the fourth lumbar vertebra was reported by Anderson (1960) and he found 12 similar cases in the literature, mostly in adults. Involvement of a single spinous process occurred in 7 patients, and 2 spinous process were affected in 5 others. The neural arch was diseased in 5 cases. Abscess formation appeared, but no muscle spasm or deformity of the vertebral bodies were noted. These lesions were less grave than those in the vertebral bodies.

Intra-medullary tuberculomas simulate tumours. Lin (1960) found reports of 104 such lesions in the literature among which 16 had been removed at operation and the remaining 88 had been uncovered at necropsy. He reported a 47 year old woman who was paraplegic, incontinent and had back and radicular pain. Plain film showed some sclerotic changes in the bodies of L_2 and L_3. Myelography disclosed a block at the level of L_1. On opening the dura, there were mild adhesions between it and the cord. A grey intrinsic mass was encountered on the lumbar enlargement, and after enucleation it measured 2.2 x 2 x 1.4 cm. Its centre was caseous and acid-fast bacilli were recovered.

Degenerative changes :

Two studies were done on the osteoporosis, one by Zehrant et al (1969) revealed that over one half of the

women 45 years of age and over had X-ray evidence of osteoporosis in the lumber spine. A small percentage of these patients had pain due to prolapse of bone tissue.

Secondly, Lutwak and Whedon (1963) estimated that over four million people at the age 35 and above, had osteoporosis of sufficient severity to cause vertebral fracture and consequent severe back pain.

Lawrence (1969) studied the frequency of disc degeneration and its relationship to back hip sciatic pain. In broad terms, the result showed that, using conventional criteria for disc degeneration, the sensitivity of radiographic examination was 59 percent (false negative rate : 41%) and the specificity 53 percent (false positive rate : 45%) it was estimated that in 13 percent of those with disc degeneration, the symptoms of pain were due to the disease and this was more common than prolapsed inter-vertebral disc, osteo-arthrosis, rheumatoid arthritis, or ankylosing spondylitis. A history of sign of nerve root involvement was found in 10 percent of the 224 patients with moderate to severe lumber disc degeneration.

Osteomyelitis :

In relation to skeletal osteomyelitis, spinal infection is relatively infrequent, appearing in about 10 percent of cases. Pritchard and Thomson (1960) reported that spinal osteomyelitis although uncommon, can present

a perplexing diagnostic problem. It occurs mainly in adults, with no particular sex predilection, but can appear in young people as well.

Fungal, Protozoan and Parasitic infestations :

Meyer and Gall (1938) mentioned 12 cases of blastomycosis in a review of mycotic diseases of the spine. In 63 cases collected from the literature by Jones and Martin (1941), 25 instances of vertebral involvement were noted, and para-vertebral abscesses were observed in 14. Colonna and Gucker (1944) observed that the bony manifestations of blastomycosis suggested chronic osteo-myelitis and presented no characteristic features. Baylin and Wear (1953) indicated that spinal blastomycosis might simulate tuberculosis.

In study of coccidiomycosis, Miller and Birsner (1949) stated that in their 17 cases there was no bone involvement by extension from soft tissue abscesses or granulomas. The spine was involved in 6, most frequently in the lumbar vertebrae. The lesion was predominantly lytic, with no involvement of the inter-vertebral discs. Some sclerosis was present, and they noted calcification in the para-vertebral soft tissues.

Murray and Haddad (1959), Mallini (1946) reported that involvement of bone with hydatid disease is fairly uncommon. In about 1 - 2 percent of cases, and about half of these have spinal lesions.

Sclerotic vertebrae :

Sarcomatous degeneration in Paget's disease affects mostly the long bones and the skull, but also has been observed in the vertebral column. Its incidence is reported as from 7.5 to 14.0 percent. Campbell and Whitefield (1943) reported 3 cases, all with compression of cord and cauda equina. Nine cases of vertebral sarcomatous degeneration out of 76 were collected from the literature by Summey and Pressly (1946) almost always in conjunction with changes elsewhere.

Multiple myeloma :

Paul and Pohle (1940) in a review of 45 cases observed ten forms, one simulating giant cell tumors and the other an osteolytic lesion seen more frequently in the spine and usually limited to a single vertebra. Goetsch (1945) also found solitary myelomas most often in the spine in his study of 61 cases. Wright (1941) reviewed a small group of patients who survived from 16 to 38 years after radical surgery for solitary plasma cytoma.

Spinal Sarcoma :

Scant incidence of primary Ewing's tumors in the spine was observed by Coley et al (1946). In their series of 91 histologically proven cases, the primary lesion was noted in the sacrum in 3 patients, but none occurred primarily in the pre-sacral vertebral column.

Vertebral osteosarcomas are uncommon. In some large series such as that of Lee and Mc Kenzie (1964), none were found. In the 600 cases reported by Dahlin and Coventry (1967), 3 were in the cervical spine, 2 in the thoracic and 5 in the lumber region, and four in the sacrum. Of the 50 cases reported by Johnson et al (1971), one originated in a vertebra. Of 413 apparently solitary tumors of the spine, Cohen et al (1964) found 8 osteosarcomas, 1 in the cervical, 2 in the thoracic and 3 in the lumber spine and 2 at the sacro-coccygeal junction.

Congenital tumors :

Chordomas constitute about 2 to 4 percent of primary bone tumors. In the spine they are frequent, appearing in about 15 to 17 percent of solitary neoplasm (Cohen et al, 1964). Dahlin (1967), in a review of 122 cases, noted that males were affected about twice as often as females. Sacro-coccygeal tumors were found present in 74 percent of males, and spheno-occipital tumors constituted 51 percent of male incidence.

Giant Cell Tumor :

Giant cell tumor of the spine are rare. Some lesions so designated in the past probably represent aneurysmal bone cysts. In a group of 76 giant cell tumors of bone, Rutter et al (1962) found none in the vertebrae

and 5 in the sacrum. Of these, 3 were benign and 2 malignant. Goldenberg et al (1970) in a review of 218 patients encountered 11 giant cell tumors in the sacrum, 2 in the lumbar and 1 in the cervical spine.

Osteoid osteomas account for about 1 percent of all spinal tumors, and constitute about 10 percent of all osteoid osteomas (Jaffe, 1965). The lumbar and cervical regions are most frequently affected. Of the 36 documented cases reviewed by Maclellan and Wilson (1967), 3 were located in the body of a vertebra and 33 in the posterior elements. Twenty were in the lumbar spine, 10 in the cervical, 5 in the thoracic spine and 1 in the sacrum. The average age was 16.7 years, and 72 percent were between 10 and 25 years old.

A case of low backache and sciatica due to leiomyosarcoma of prostate has been reported. This unusual manifestation of this very rare tumor is highlighted along with a brief review of its incidence, clinical picture, pathology and treatment (Dave and Lal, 1967).

In 1919 Dandy recognised the diagnostic possibilities of air contrast for diagnosis of spinal canal tumors, also noted by Jacobaeus in 1921. Because of technical difficulties in obtaining adequate roentgenograms, relatively little was accomplished. However, interest was again stimulated by Sicard & Forestier (1922), who

established Lipiodol Myelography as a significant advance in neuro-radiology. They injected Lipiodol into the epidural space, and accidently observed that when Lipiodol entered, the subarachnoid space, it flowed freely, produced no perceptible ill effects, and recognised the importance of this in the diagnosis of spinal cord tumors.

Trauma :

Analysis of 150 referals to 'back pain clinic' revealed that there were 59 (46%) with a history of precipitating injury or short-term over indulgence in unaccustomed activity in association with their first attack (Anderson, JAD, 1976).

Wilson and Katz (1969) found only 1 in 250 cases of stress fractures in military trainees.

Endocrine disturbances :

Hypoparathyroidism presenting as ankylosing spondylitis was reported by Chaykin et al (1970). This case was reported in detail (Jimenez et al, 1971), with emphasis on increased vertebral and pelvic sclerosis and calcification of the posterior longitudinal ligament of the entire spine, as well as calcification of the apophyseal articulations.

In review of 20 cases of Acromegaly, Lang and Bessler (1961) found changes in the length of the vertebral

bodies in 10, changes in the inter-vertebral disc in 12 and calcified disc in 4. Of 6 cases with lumbar spine roentgenograms, inter-vertebral disc changes were present in 6, with appositional growth of bone, thickening and osseous overgrowth. Changes in the length of the vertebral bodies, with modelling of the posterior circumference of the bodies was noted in 4. Scalloping of the posterior surface of the vertebral bodies, usually more pronounced in the lumbar spine, also is fairly frequent in the thoracic segment.

Sucheda (1950) reported 7 cases of infantile myxedema, all with incomplete wedging of L_2 with a variable angular gibbus. Evans (1952) made a similar observation.

Middlemass (1959) noted that only 3 out of 32 adult cretin showed reduction in vertebral height and increased thickness of the inter-vertebral discs. Only 4 had localised thoraco-lumbar abnormalities, only with visible spinal deformity. He remarked on the high incidence of epiphyseal dysgenesis, and deformities of the spine in infants and children, and the fact that there were relatively uncommon in adult life inspite of deficient thyroid therapy.

Metabolic Disorders :

A form of osteoporosis peculiar to prepubertal children in whom the only constant metabolic defect was inability to absorb dietary calcium has been observed rarely

(Dent and Friedman, 1965). In their 6 cases, vertebral changes predominated, including wedging and multiple compression fractures, widened inter-vertebral discs, with a biconvex configuration, as well as loss of the normal bony trabecular pattern and then cortices. The thickness of the cortex of the long bones was markedly reduced with decreased strength and multiple fractures. They theorized that this unusual condition might be due to a combination of two defects, one producing a loss of absorptive capacity of calcium from the bowel and then some defect of osseous calcification. No other element of malabsorption was encountered.

Spondylolysis and spondylolisthesis :

Spondylolysis with spondylolisthesis was found in 2 - 3 percent of the general population (Meyer, 1932; Magora and Schwarts, 1980). The fifth lumbar vertebra was most often involved and spondylolysis at a higher level was rare. These defects rarely existed in more than one vertebra in the same individual.

Moreton (1966) in a review of 32600 examinations found isthmic defects in 7 to 7.6 percent, and from 72 to 88 percent were bilateral. The lumbar vertebra was affected in 91.2 percent. He noted that these interruptions remained ununited in radiologic examination, but visible healing occasionally was present.

Several classifications have been suggested that of Meyerding (1932, 1941) is favoured. He divided spondylolisthesis into 4 groups based on division of the superior surface of the subjacent vertebral body into 4 equal parts. Grade 1 indicates a step of less than 25 percent, grade 2 upto 50 percent and grade 3 and 4, 75 percent or greater. When the step is about 75 percent, the upper vertebra may tip anteriorly so that it overhangs the upper sacrum, referred to as spondyloptosis.

The incidence of spondylolisthesis has been reported as about 3.5 percent (George, 1939), to about 5 percent (Bailey, 1947). Baily observed isthmic defects in about 4.4 percent of 3080 lateral lumbar roentgenograms in unselected patients. Only 0.5 percent had low back pain and he concluded that these were not associated with recent trauma. Garland and Thomas (1946) found spondylolisthesis in as many as 10 percent of cases of low back pain in Army and Navy personnel referred for X-ray examination. It has been noted that a developmental defect of the spinous processes was seen 5 to 10 times more often with spondylolisthesis than in normal adults (Meyerding, 1932; Rome & Roche, 1935; Wiltse, 1962). The largest number of patients are seen in adolescence or in adults, mostly between 20 and 30 years (Meyerding, 1943).

Finn et al (1984) reported that radiological investigation demonstrated spondylolisthesis and

osteochondrosis at two levels, between L_{4-5} and $L_{5-S}V_1$ in combination with spondylolysis at three levels from L_{3-5}. These spondylolysis at L_4 had a radiological appearance suggestive of pseudoarthrosis.

Donald B. et al (1971) had a study on spondylolysis in Alaskan Eskimo. His study provided further evidence that the condition had a genetic basis with the high incidence in the northern Eskimo explained by a concentration of these genetic factors in an isolated inter-related population or extended pars inter-articularis defects were associated with a moderate degree of back pain but produced no objective physical findings in this population of stoic, uncomplaining and hardy people.

Kruna et al (1973) studied the structure of the pars inter-articularis of the lower lumbar vertebra and its relation to the etiology of spondylolysis. They included that -

1. An anatomical study of the bony structure of the pars inter-articularis of the fourth and fifth lumbar vertebra had been made in specimens from seven cadavers aged seventeen to sixty seven.

2. Layers of cortical bone had been described antero-laterally and postero-medially which are thickest in the narrowest region of the pars.

3. In one specimen from a seventeen year old male a healing fracture was found in the antero-lateral layer of cortical bone in the right neural arch of the fourth lumbar vertebra.

4. The stresses to which the pars is subject consist primarily of sheer forces applied to the articular processes. The significance of these stresses to the etiology of spondylolysis was discussed.

Privett et al (1975) reported a case in which there was bilateral spondylolysis involving LV_3. LV_4 and LV_5. It was thought that the condition was due to postural stress in a patient having a predisposing genetic weakness of the pars inter-articularis.

John Hanson et al (1987) reported fifty two patients with low back pain and spondylolisthesis at $L_5 - S_1$ had discogram performed at the L_{4-5} level. Retrolisthesis at L_{4-5} occurred in 44 percent, but no direct relationship was demonstrated between the extent of retrolisthesis and either the grade of spondylolisthesis or the presence of disc damage. There was an inverse relationship between the degree of spondylolisthesis and L_{4-5} disc damage. Thirty six patients were assessed for symptomatic pain reproduction during discography. Fourteen (39%) had normal nuclear morphology and no pain induction on infection. Twenty two patients had disc damage and 11 (50%) had

symptomatic pain induced by infections. These results were correlated with the discographic appearance.

Sim (1973) reported posterior wedging of the 5th lumbar vertebral body in lumbo-sacral spondylolisthesis together with the degree of step had been measured. Comparison was made with the vertebral body contour in patients without spondylolisthesis. The average wedging in spondylolisthesis was significantly greater than in patients without this condition and forms a characteristic radiological sign. The degree of wedging and of step show a statistically valid correlation.

A group of 77 cases of vertebral retrolisthesis were encountered in 493 verified cases of lumbo-sacral disc protrusion by Gillespie (1951). In 35, the average backwards displacement ranged from 0.3 to 0.9 cm and the majority had antero-posterior type of articular facet. Retroposition occurs most often at the lumbo-sacral and the cervical regions, and appears with arthritis herniated discs, degeneration of the inter-vertebral cartilages, infection and trauma. Retrolisthesis alone was not necessarily a cause of backache.

Graham et al (1984) reported radiological and myelographic appearances of 14 patients with severe lumbo-sacral spondylolisthesis had been reviewed in relation to compression of the cauda equina and their clinical symptomatology.

Patient could be seperated into two groups as defined by the position of the L_5 neural canal. In group 1. the arch was displaced downwards and the cauda equina compression was due to pressure from the L_5/S_1 disc and was related to the degree of listhesis. L_5 root sheath abnormalities predominated in this group. In group 2, the neural arch maintained a more normal position and the comparison which was unrelated to the degree of slip occurred between the arch and the posterior aspect of the sacrum S_1 root lesion occurred in these patients due to pressure from arch. Clinical symptoms and sign were also more prominent in this group.

Spinal canal stenosis :

Sandhu et al (1976) evaluated "canal body ratio" from plain radiograph of lumbo-sacral spine using the technique of Jones and Thompson (1968) is a reasonably good preliminary and pre-operative method as a guide to lumbar spinal stenosis. A value of canal body ratio of more than 1 : 6.0 has taken as indicative of spinal stenosis of the 100 patients of low back-ache (beyond the age of 35 year). The incidence of spinal stenosis was observed in 10 percent. Spinal stenosis is more common in male (8 males, 2 females in his study) and predominantly in the age group of 41 - 60 years (8 cases in his study).

Diseases of Inter-vertebral Discs

Kyphosis Dorsalis Juvenalis :

Scheuermann (1921) originally considered the condition as osteochondrosis affecting the middle and lower thoracic and the upper lumbar vertebrae due to deficient epiphyseal growth occuring more often in females between 10 & 14 years old.

Association of spinal extradural cysts with juvenile kyphosis was described by Cleward and Bucy (1937) who regarded occlusion of epidural venous channels by pressure from a cyst wedged between the bony walls of the canal and the dura as causative. Kyphosis dorsalis without such a cyst was considered due to inter-vertebral stasis. The changes were regarded as neither inflammatory nor due to vertebral epiphyseal disturbances.

Other instances of kyphosis dorsalis with extradural cysts included by Wise & Foster (1955) in their review of 33 cases from the literature, including one of their own. Of 33 cases, 23 were men and the cyst was thoracic in location in 24. Varying kyphosis dorsalis was seen in 19, absent in 11 and not mentioned in 3.

Seven additional cases reported by Nugent et al (1959), 2 were in adolescents and 1 had Scheuermann's disease.

Calcification of Disc :

Description of calcification in the nucleus pulposus in adults are not common and a limited search of the literature had revealed only one report of such calcification in the lumbar region (Sandstrom, 1951).

Discal calcification in children is less frequent than in adults, but is not rare. Melnick & Silverman (1963) reported 48 cases from the literature with 5 of their own. The youngest was 7 days old, and the size and density of the lesion suggested its presence at or before birth. The incidence of childhood discal calcification diminishes towards adolescence.

Simpson (1964) reported that calcification in the annulus fibrosus is almost certainly the result of a degenerative process. However, it is highly improbable that degenerative changes play any part in the etiology of nucleus pulposus calcification. Probably the most important facts to support this are the preponderance of such calcification in the thoracic spine, a region far less liable to degenerative changes than the lumbar spine, and the relative frequency of the condition in childhood.

Herniation of the inter-vertebral Discs :

Pheasant (1977) published the figures for entire state of California, nearly one half of the patients were

hospitalised with prolapsed disc or symptomatology indicative of disc diseases; 29 percent with sprain or strain; 8 percent with vertebral fractures and about 13 percent were due to Lumbalgia.

In 1981 Aixon and his co-worker reported that prolapse of the inter-vertebral discs can be recognised from plain radiograph by narrowing of the inter-vertebral joint space, by formation of fraction osteophytes on anterior aspect of the vertebral body and by certain other deformities of the spinal column. 80 percent of their cases revealed signs suggestive of disc prolapse in one form or the other and in half of the cases, it was possible to predict the exact level accurately.

In 1920 Schmorl et al showed the pathologic lesions (herniation) of the nucleus pulposus are frequently (38%) found in postmortem examination.

In 1934, Mixter and Barr showed that nerve root compression caused by herniation of the nucleus pulposus was common cause of low back and sciatic pain.

Herniation of lumbar discs occur mostly in males in their third or fourth decades, but also appear in the second as well as in the later age groups. The youngest patient was Fernstrom's (1956) 11 year old girl. Love (1947) had 25 out of 1217 patients in the second decade. Five patients 15 years or less were reported by Webb et al (1984).

Epstein & Lavine (1964) observed 10 out of 560 patients with lumbar herniated disc who were between 15 and 19 year old.

Nagi et al (1986) reported fifty cases of lumbar disc prolapse diagnosed on the basis of a standard clinical protocol were subjected to metrizamide myelography. There was 100 percent correlation between the myelographic and operative diagnosis in cases of postero-lateral (32) and central (4) disc prolapse. A far lateral disc prolapse was diagnosed in 8 cases and was found to be correct in (7) 87.5 percent cases at exploration. A patient clinically presenting like a disc prolapse may in fact have some allied condition which mimicks like a prolapse. In their [illegible] series, four cases of lateral canal stenosis and two cases of sub-articular entrapment were detected on metrizamide myelography which later showed surgical correlation of 75 percent and 100 percent respectively. Incidently, they detected a case of conjoint L_4 and L_5 nerve roots in a case of postero-lateral disc prolapse at L_5- S_1 level. Metrizamide had distinct advantage in cases of massive central disc prolapse. Because of its low viscosity, it can slip around the margins of a relative block thereby outlining the sub-arachnoid space and the roots below the level of a central prolapse can be easily ascertained. Metrizamide myelography is a safe investigation and the side effect observed are of a transient nature. It had a definite edge over myodil

myelography as the latter is likely to be normal in cases of lateral canal stenosis for lateral disc prolapse and sub-articular root entrapment.

Ramakrishna Reddy et al (1987) reviewed 200 operated cases of lumbar disc prolapse and their myelograms. There was 87 percent correlation of myelographic findings with surgery. The diagnostic reliability is more at L_{4-5} than $L_5 - S_1$ disc prolapse. This may be due to wider extradural space at lumbosacral level. It was emphasized that myelography should always precide surgery.

Myodil myelography was undertaken by Amarjeet Singh et al (1987) in cases clinically presenting with prolapse inter-vertebral disc. Myelography was carried out in 324 cases in their series, there were 212 positive myelograms (65.5%) and 112 negative myelograms (34.5%). 157 individuals were subjected to surgery. Myelographic diagnosis was fully verified in 122 patients. This gives myelographic accuracy of 77.5 percent. In 10 patients, myelographic findings were partially verified. Six cases showed false positive and four false negative myelograms.

Pre-employment Radiological Examination :

The importance of pre-employment roentgenographic examination of the spine industry is controversial. O'Connor (1946) stated that these helped to reduce the incidence of

back strains by permitting better job selection. Barton and Biran (1946) reported 856 defects in 498 patients in 1000 consecutive preplacement examinations and concluded that spondylolisthesis arthritis and in some cases transitional lumbo-sacral vertebrae were significant in workers over 45 years of age. In a series of 3000 pre-placement examinations over a 2 year period, Allen and Linden (1950) encountered a large number of asymptomatic conditions, including degenerative processes and congenital or developmental anomalies. In a recent conference on the value of low back pre-employment X-ray examination (1973) it was generally concluded that these had little value. It was pointed out that such problems occurred with considerable frequency in sedentary occupations, and that minor defects had no relationship to subsequent events. However, one point in relative disagreement had to do with those engaged in strenuous labor, such as rail road workers. Survey of pre-employment examination recently reported are those of Moreton (1969), Rowe (1969), Magora (1970), Mè-enab (1970).

Radiographr :

Pennal et al (1972) described that radiological examination of the lumbar spine from childhood to old age is accomplished in ways designed to provide information concerning specific points. A routine roentgenographic examination should consist of antero-posterior and lateral

views, and when indicated, oblique views for the articular facets and the neural arches. If information concerning mobility is required, studies may be made in the erect frontal views with the patient bending sharply towards the right and left for demonstration of change in the inter spaces between the various lumbar vertebrae. Lateral studies are made in flexion and extension.

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MATERIAL AND METHODS

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The material covers all cases (between age group 10 - 50 years) suffering from clinically suspected chronic low backache and also expected person might be having radiologically positive for low backache, attending O.P.D. and the patients admitted in the ward of M.L.B. Medical College & Associated Hospital, Jhansi (U.P.).

A careful detailed history and physical examination of each case was elicited with particular emphasis on the following points :

- Name of the patient,
- Age of the patient,
- Sex,
- Occupation,
- Socio-economic status.

Chief complaints and history :

1. Pain
   (a) Duration
   (b) Site
   (c) Character
   (d) Relation to movement
   (e) Relation to weather

2. History of trauma
3. Past history
4. Family history
5. Dietary history

Clinical Examination :

1. General Examination :
    (a) General condition
    (b) Pulse
    (c) Blood pressure
    (d) Temperature
    (e) Respiration rate
    (f) Pallor
    (g) Icterus
    (h) Cyanosis
    (i) Clubbing
    (j) Oedema
    (k) Lymphadenopathy
2. Respiratory system
3. Cardio-vascular system
4. Central nervous system
5. Abdominal examination
6. Local Examination (Lumbo-sacral spine)
    (i) Inspection
        (a) Gait
        (b) Attitude/Deformity (Kyphosis/Scoliosis)
        (c) Swelling
    (ii) Palpation
        (a) Tenderness
        (b) Swelling

(iii) Percussion

(iv) Movements

(v) Rigidity of spine

(vi) Measurements

Investigations :

Blood (Hb%, TLC, DLC, ESR)

Urine (Sugar, Albumin)

Radiological Investigations :

(a) X-ray of lumbo-sacral vertebral joint

(i) Antero-posterior view,

(ii) Lateral view,

(iii) Oblique view.

(b) Myelography (if required)

TECHNIQUE OF RADIOGRAPHY

(1) Antero-posterior (Basic) View :

The patient is placed in the supine position and carefully centralised on the X-ray couch, with the film displaced towards the head to accommodate the oblique projection of the X-ray beam.

Centre

At the level of anterior superior iliac spine, the centre is in the mid-line with the tube angled 5 - 10 degrees towards the head. The degree of angulation required

will very according to the type and sex of subject. Factors are 70 kv with 80 mAs. The film distance should be 36" with grid.

(2) Lateral View :

The film taken laterally, with the patient in both the erect and the horizontal positions, show differences in the alignment of the lumbo-sacral region due to posture. The same differences are shown according to whether the patient is lying with the figure extended full length or flexed.

It is important to adjust the patient to the true lateral position, with the mid-line of the lumbo-sacral region parallel to the film. In the horizontal position, a foamed sponge roll under the mid-lumbar region will have the desired effect, and a smaller pad between the hip and couch will be appreciated by the patient. Flexion of hips and knee, with the raised limb supported on sand bags, is essential for immobilisation.

In the erect position, the shoulder rests against the film support, the feet being placed apart to give balance.

Centre

Three inches forward from and at the level of the fifth lumbar spinous process. The factors are kilovoltage 90 - 120 with 150 - 40 mAs respectively. The film distance should be 36" with grid.

The great density of this region may prohibit an excessive focus film distance when necessary to compensate for vertebrae to film displacement unless a high power unit is available, but at 36" using a localising cone and fast screens, satisfactory results are obtained.

Radiograph is included to show high kilovoltage technique, 120 KVp, 30 mAs, and radiograph to show the effect of using low kilovoltage, 85 KVp, 120 mAs.

For the larger subject, high kilovoltage is essential for this region although the effect of scattered radiation is inevitable. A compromise is found at 100 KVp.

The third radiograph confirms the value of the lateral projection for this pathological condition.

(3) Oblique View :

When the desired information could not be taken from lateral projection, the oblique position has been performed. The patient is rotated 45 degrees from the supine position and is supported and immobilised with plastic sponge or balsa wood blocks and sand bags.

Centre :

Approximately 3 inches medially and 1 inch above the anterior superior iliac spine on the raised side. The factors are kilovoltage 85 with 75 mAs. The film distance should be 36" with grid.

(4) Myelography :

Technique

The contrast media of choice is iohexol omnipaque or myodil. The lumbar area is most simply examined by large volume of iohexol containing 240 mg of I/ml with the feet dependent. For dorsal area iohexol containing 240 mg of iodine per ml is injected with the patient in lateral decubitus position with a firm pad beneath the head and neck to tilt the vertex towards the ceiling and with the head of the table dependent so as to pool the contrast medium in the gravity of a dorsal curve.

For myelographic study, spinal tap has been performed using a needle no longer than 20 gauge. It is not necessary to remove the contrast at the end of the procedure so that if desired, the needle may be withdrawn immediately after contrast injection. Films has been taken, in antero-posterior, oblique and lateral projections and where possible decubitus views has been taken. Films has been also taken in the lateral projection with the patient both prone and supine, and the lower dorsal spinal cord will be examined with the patient in the supine position.

Interpretation of shiagram :

The following radiographic details were taken into account :-

1. Loss of lumbar lordosis : i.e. straightening of lumbar curve at the lower lumbar segments.

2. Inter-vertebral disc space : was measured in lateral skiagram. It is the distance from middle of one vertebrae to the middle of another vertebra.

3. Presence/absence of ligamentous calcification.

4. Presence and absence of osteophytes.

5. Height of the body of vertebra.

6. Axis of vertebral alignment.

7. Measurement of sagittal diameter of spinal canal.

   In lateral film, it is from middle of posterior surface of body to the point of fusion of laminae to spinous process.

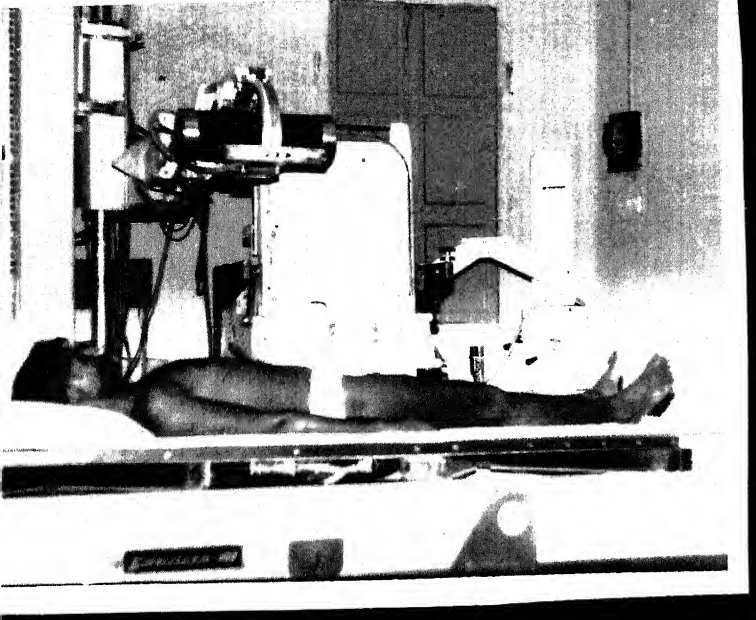
8. Size of inter-vertebral foramina. In oblique views by drawing a transverse line in middle of each foramina.

9. Marginal sclerosis of vertebrae.

10. Congenital fusion of vertebrae.

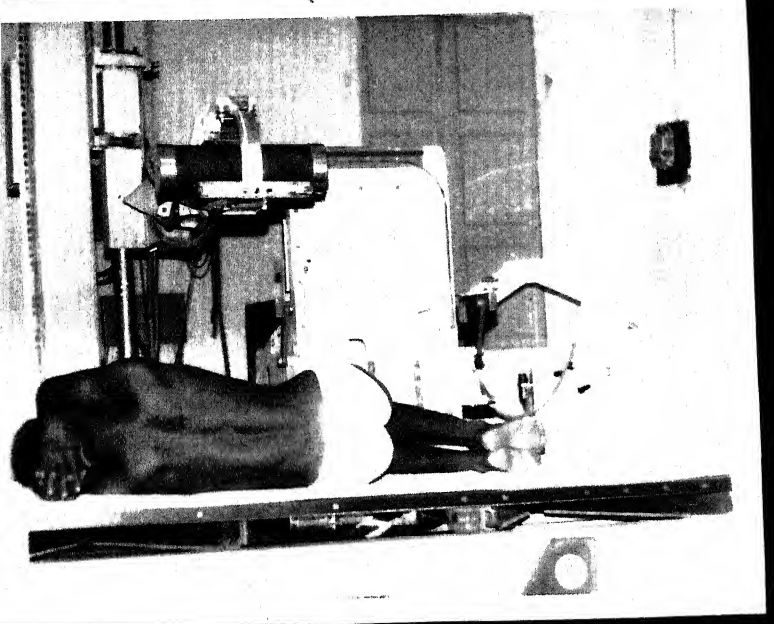
11. Sublaxation/Dislocation of lumbar vertebrae.

12. Any congenital anomalies.



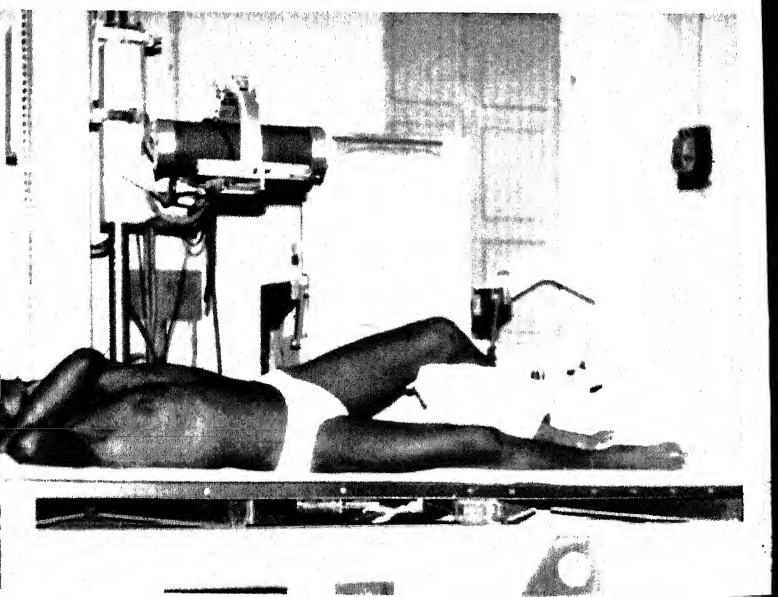
Photograph - 1

Showing antero-posterior radiography of lumbo-sacral spine.



Photograph - 2

Showing lateral radiography of lumbo-sacral spine.



Photograph - 3

Showing oblique radiography of lumbo-sacral spine.

AIMS OF THE STUDY

1. To investigate various causative factors of low backache in age group from 10 to 50 years.

2. The incidence of various common causes in the low backache in Indian population as compared to Western Society.

****

OBSERVATIONS

OBSERVATIONS

The present study "Radiological assessment of chronic low backache" was carried out in the Department of Radiology, M.L.B. Medical College & Hospital, Jhansi. Total 100 cases were studied. They were thoroughly examined clinically and investigated radiologically and following observations were made.

Out of total 100 cases, they were divided into different age groups. In first group (10-21 yrs.) were 3 cases (3%), IInd group (21 - 30 yrs.) were 12 cases (12%), IIIrd group (31-40 yrs.) were 25 cases (25%), IVth group (41-50 yrs.) were 60 cases (60%). The maximum cases were found in IVth group, followed by IIIrd group and minimum cases were in Ist group (Table I).

Table - I

Age incidence of low backache.

Age group (in years)	No.of cases	Percentage
Group I (10 - 20)	3	3.0
Group II (21 - 30)	12	12.0
Group III (31 - 40)	25	25.0
Group IV (41 - 50)	60	60.0
Total	100	100.0

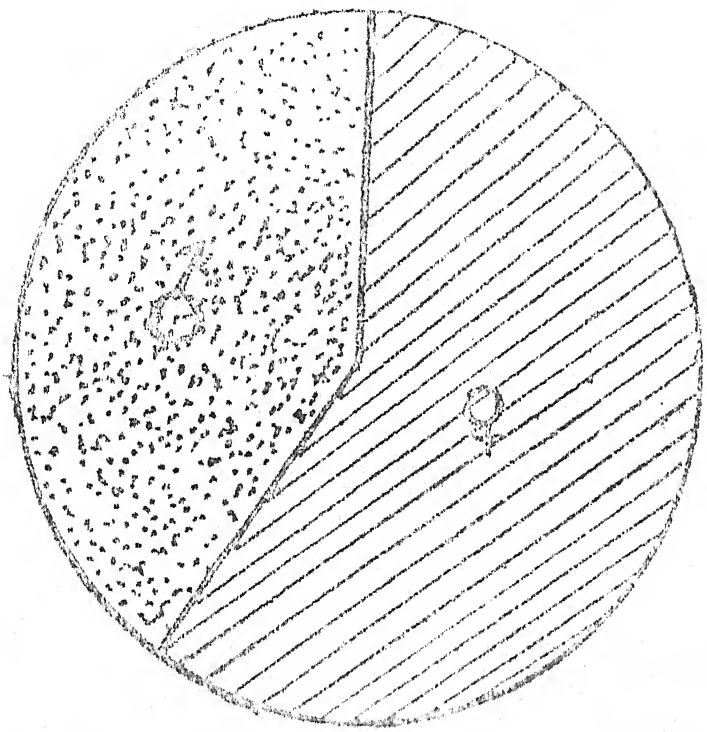
There were 43 male cases (43%) and 57 female (57%) cases (Table II and Diagram 1).

Table - II

Sex incidence of low backache.

Sex	No. of cases	Percentage
Male	43	43.0
Female	57	57.0
Total	100	100.0

Out of 43 male cases, 2 cases were in 1st group (10-20 yrs.) (4.65%), 5 cases were in IInd group (21-30 yrs.) (11.63%), 8 cases were in IIIrd group (31-40 yrs.) (18.6%) and 28 cases were in IVth group (41-50 yrs.) (66.12%). Out of 57 female cases, 1 case was in group 1st (10-20 yrs.). (1.75%), 7 cases were in group IInd (21-30 yrs.) (12.25%). 17 cases were in group IIIrd (31-40 yrs.) (29.75%). and 32 cases were in group IVth (41-50 yrs.) (43.75%) (Table - III).



Male : 43%
Female : 57%

Diagram - 1 : Showing sex incidence of low backache.

Table - III

Age and sex distribution of low backache.

Age group (in years)	Male		Female		Total	
	No.	%	No.	%	No.	%
I (10-20)	2	4.65	1	1.75	3	3.0
II (21-30)	5	11.63	7	12.25	12	12.0
III (31-40)	8	18.60	17	29.75	25	25.0
IV (41-50)	28	64.12	32	43.75	60	60.0
Total	43		57		100	100.0

According to the physical activity, the cases were divided into three groups. In the first group were casual workers and they were named as Sedentry. 19 cases (19%) were found in this group. Second group was named as active and number were 21 (21%) and in the third group was hard working. Sixty cases were found in this group (Table IV).

Table - IV

Incidence of low backache in various working groups.

Working group	No. of cases	Percentage
Sedentary	19	19.0
Active	21	21.0
Hard working	60	60.0
Total	100	100.0

The various presenting symptoms suggestive of low backache were observed in these studies. They were as follows:

According to the nature of back pain, cases were divided into three groups. Firstly cases having stable pain, secondly cases having pain where intensity increased in lying or supine position and thirdly cases having pain while bending forward. The occurence being 52 cases (52%), 17 cases (17%) and 31 cases (31%) respectively. According to intensity of pain, cases were divided into three groups - mild, moderate and severe, where the occurence was 56 cases (56%), 24 cases (24%) and 20 cases (20%) respectively. Back stiffness was present in 40 cases (40%). Painful restriction of back movement was present in 42 (42%) cases.

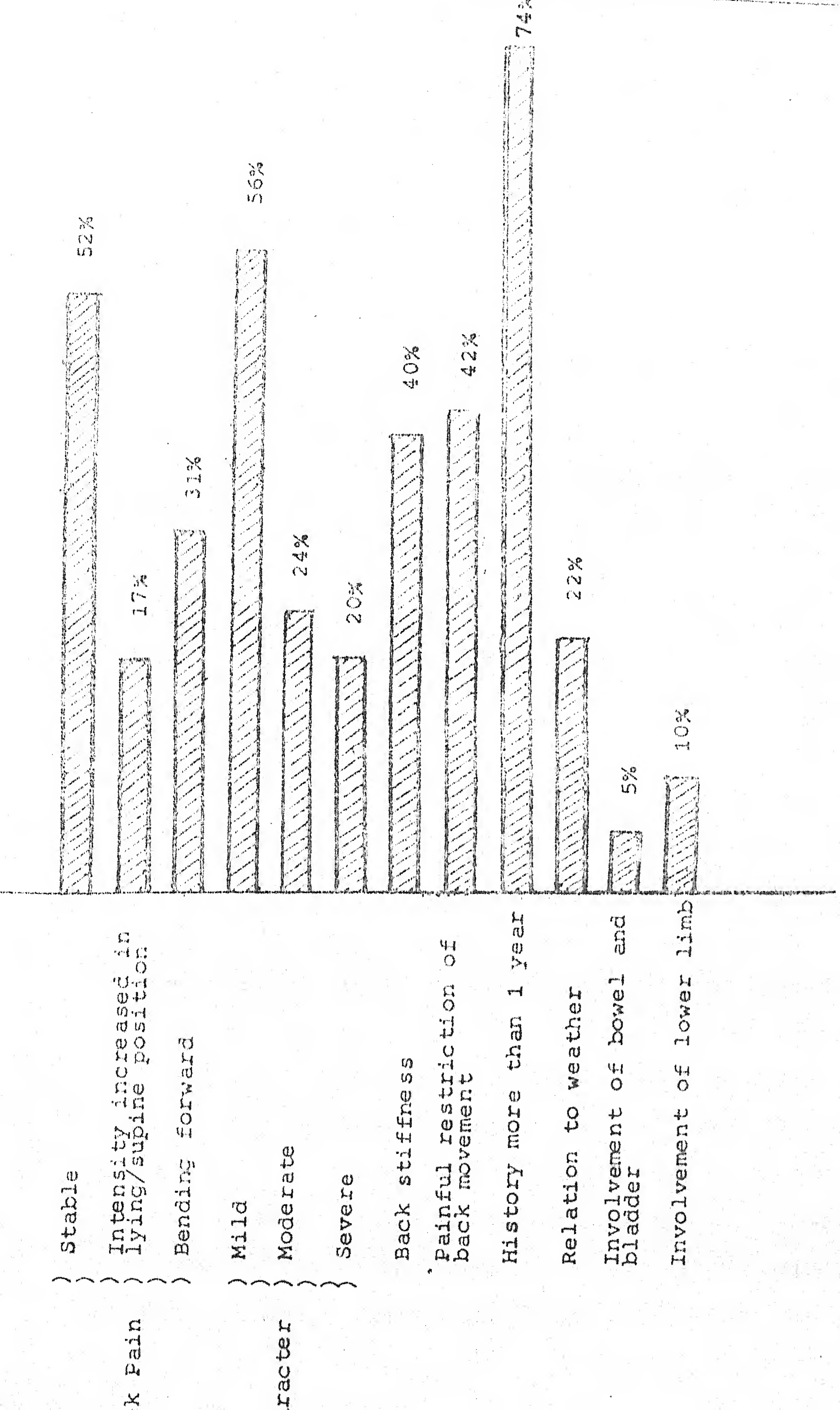
The history of more than 1 year was present in 74 cases (74%). The pain related to weather was present in 22 cases (22%), involvement of bowel and bladder was present in 5 cases (5%) and involvement of lower limb was present in 10 cases (10%) (Table V and Diagram 2).

Table - V

Symptomatic presentation of low backache.

Presenting symptoms	No.of cases	Percentage
Back pain :		
(i) Stable	52	52.0
(ii) Intensity increased in lying or supine position	17	17.0
(iii) Bending forward	31	31.0
Character :		
(i) Mild	36	36.0
(ii) Moderate	24	24.0
(iii) Severe	20	20.0
Back stiffness	40	40.0
Painful restriction of back movement	42	42.0
History more than one year	74	74.0
Relation to weather	22	22.0
Involvement of bowel & bladder	5	5.0
Involvement of lower limb	10	10.0

Diagram - 2 : Showing Symptomatic Presentation of low backache.



All cases of low backache were investigated radiologically on Plain X-ray of lumbo-sacral spine, Antero-posterior and Lateral view. 21 cases did not showing abnormality and 79 cases were showing radiological findings (Table VI).

Table - VI

Showing radiological positive cases.

Radiological sign	No.of cases	Percentage
Positive cases	79	79.0
Normal	21	21.0
Total	100	100.0

Out of 79 cases showing abnormal radiological findings, 20 cases were of osteo-arthritis (25.40%), 10 cases of osteoporosis (12.70%), 9 cases of old healed Pott's spine (11.10%), 7 cases of loss of lumbar lordosis (8.89%), 7 cases of prolapsed inter-vertebral disc (8.89%), 6 cases of spondylolisthesis (7.62%), 6 cases of ankylosing spondylitis (7.62%), 4 cases of spina bifida (5.08%), 3 cases of old traumatic collapse (3.81%), 2 cases of osteomalacia particularly in females (2.54%), 1 case of diastematomylia (1.27%), 1 case of lumbar canal stenosis which was proved by

Photograph - 4

Spondylolisthesis with osteo-arthritis: Showing presence of grade II spondylolisthesis at L_4 over L_5. A round loose body at anterior surface also seen.

Photograph - 5

Spondylolisthesis with osteo-arthritis: Showing kissing attitude osteo-phytosis in L_4 and L_5 with napolean cap deformity.

Photograph - 6

Osteo-arthritis : Showing osteo-arthritic changes. Scoliosis deformity also seen.

Photograph - 7

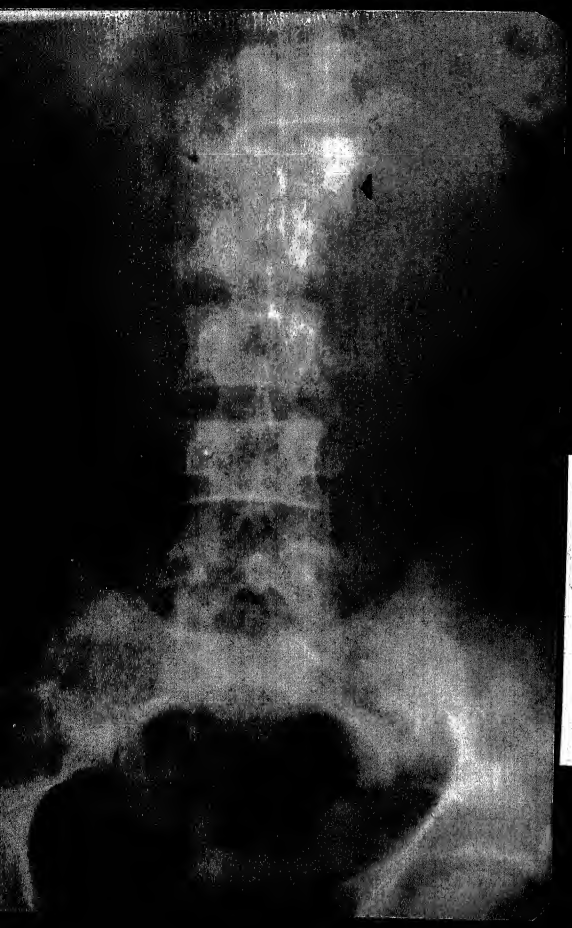
Osteo-arthritis : Showing osteophytosis in lumbar spine.

Photograph - 8

Ankylosing spondylitis : Dense calcified inter-spinous ligament seen.

Photograph - 9

nkylosing spondylitis : ense calcified inter- pinous ligament seen. steo-arthritic changes lso seen.



Photograph - 12

Pott's Spine : Showing involvement of D_{12}, L_1, L_2, lateral dislocation with osteo-arthritic changes are also seen.

Photograph - 13

ott's Spine : Showing the
ott's spine of D_{12} vertebrae.
elography showing extra-
ural tumor like presentation.

Photograph - 16

Prolapse inter-vertebral disc : Showing prolapse of inter-vertebral disc at L_5, S_1 with osteo-arthritic changes.

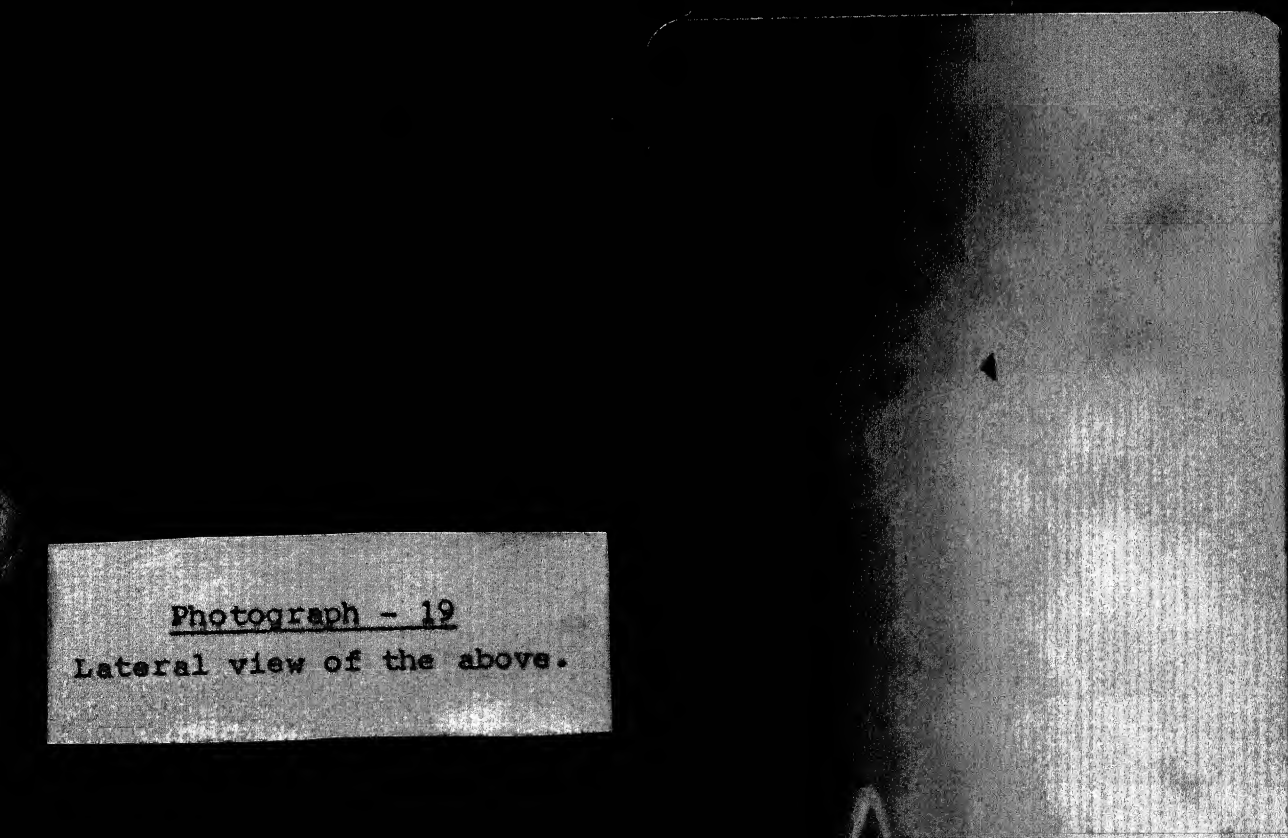
Midas

Photograph - 17

Osteoporosis : Lumbar spine showing osteoporosis with osteo-arthritic changes.

Photograph - 18

Congenital anomaly : Showing congenital fusion of $L_{3,4,5}$ (Antero-posterior view).

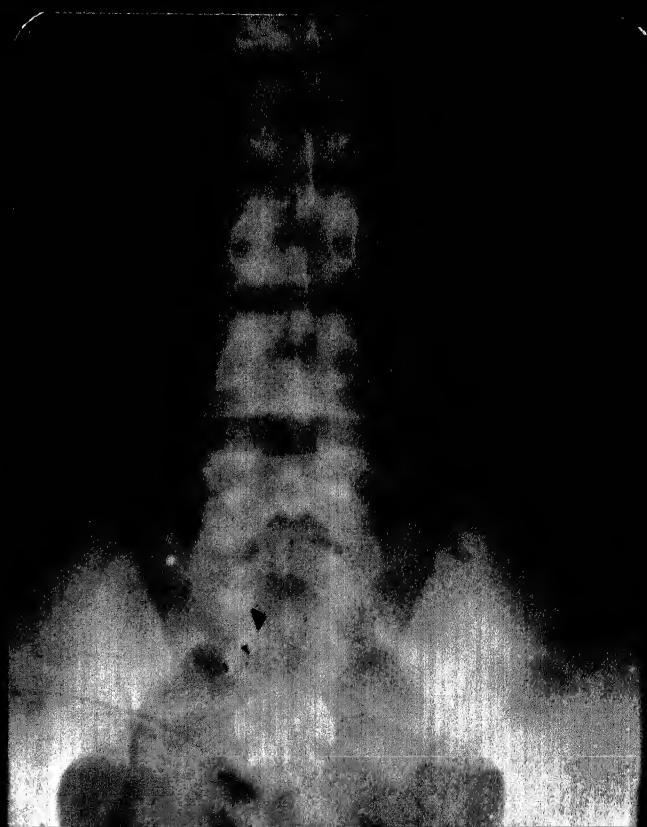


Photograph - 19

Lateral view of the above.

Photograph - 20

Congenital blocked vertebrae at $L_{1,2,5}$. Showing bilateral sacralisation.

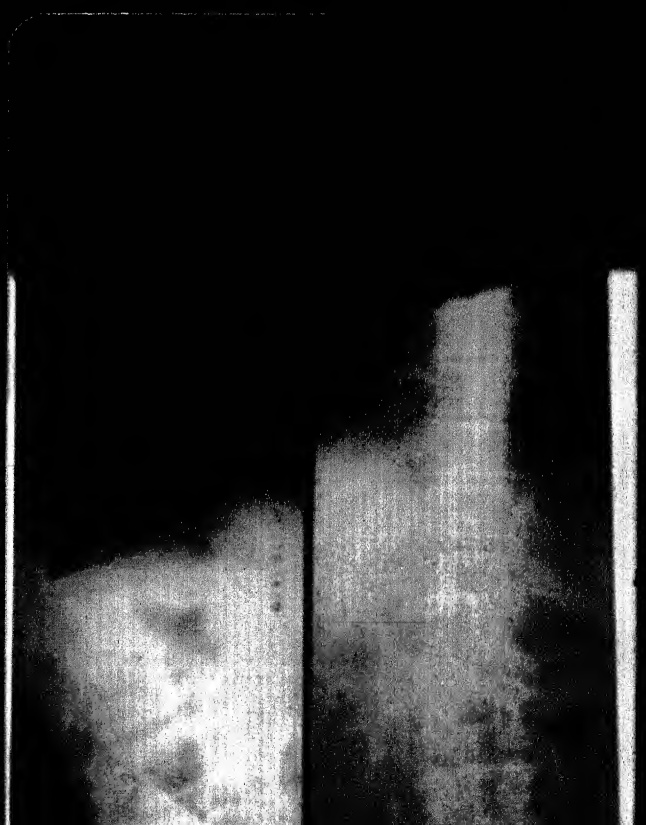


Photograph - 21

Diastematomyelia : Showing bony bar in the sacral canal.

Photograph - 22

Osteochondritis : Follow-up case of osteochondritis showing Schmorl node at D_{12} & L_1 vertebrae.



Photograph - 23

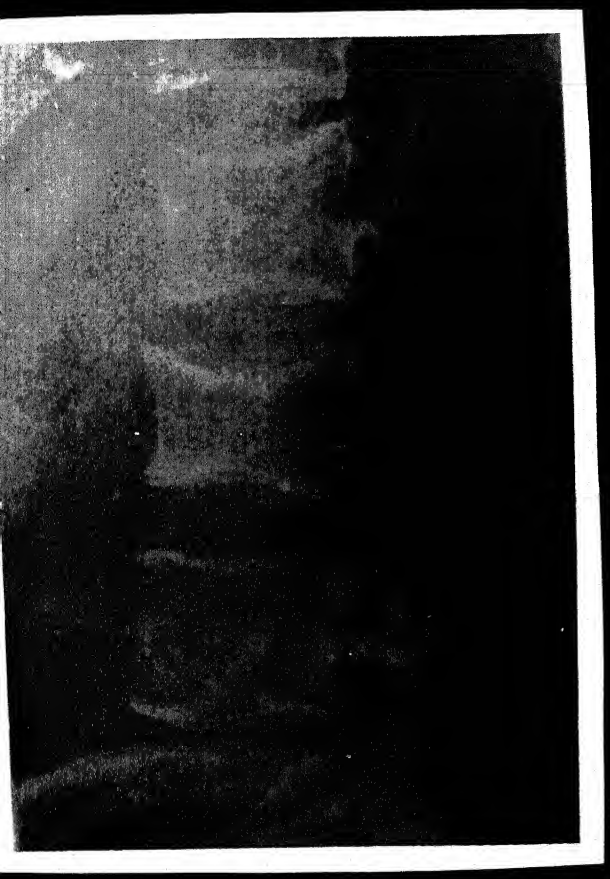
Showing Calve's disease.

Photograph - 24

Lumbosacral Spine (Lateral view). Showing defuse osteoblastic secondary deposit involving body of L_5 & neural arches of $L_{3,4,5}$.

Photograph - 25

Lumbosacral Spine (Anteroposterior view) Showing osteoblastic secondary deposit involving bases of pelvis and upper end of femur.



Photograph - 26

Osteomalacia : Showing decreased density with reduction of vertebral height. Biconvex disc are seen.

Photograph - 27

Osteoporosis : Showing osteoporetic changes in lumbar vertebrae.

Myelography (1.27%). 1 case of congenital vertebral fusion (1.27%). 1 case of Calve's disease (1.27%) and 1 case of secondary deposit (1.27%) (Table - VII).

Table - VII

Showing radiological sign of various diseases causing low backache (In Radiological positive cases).

Diseases	No.of cases	Percentage (In positive cases)	Total Percentage
Osteo-arthritis	20	25.40	20.0
Osteoporosis	10	12.70	10.0
Old healed Pott's spine	9	11.10	9.0
Loss of lumbar lordosis (due to muscle spasm)	7	8.89	7.0
Prolapsed inter-vertebral disc	7	8.89	7.0
Spondylolisthesis	6	7.62	6.0
Ankylosing spondylitis	6	7.62	6.0
Spina bifida	4	5.08	4.0
Old traumatic collapse	3	3.81	3.0
Osteomalacia	2	2.54	2.0
Diastematomyelia	1	1.27	1.0
Lumbar canal stenosis (Myelographic proven)	1	1.27	1.0
Congenital vertebral fusion	1	1.27	1.0
Calve's disease	1	1.27	1.0
Secondary deposit	1	1.27	1.0
Total	79	100.00	100.0

Out of 20 cases of osteo-arthritis, 16 cases showing anterior osteophytes (80%), 11 cases showing posterior osteophytes (55%), 4 cases showing reduction in height of vertebral body (20%), only 4 cases were showing subluxation (20%), marginal sclerosis was seen only in 3 cases (15%), loose bodies were found only in 3 cases (15%) and 6 cases showing narrowing of disc space (30%) (Table VIII).

Table - VIII

Showing radiological sign in osteo-arthritis.

Radiological sign	No.of cases	Percentage
Osteophytosis :		
i) Anterior	16	80.0
ii) Posterior	11	55.0
Reduction in height of vertebral body	4	20.0
Subluxation	4	20.0
Marginal sclerosis	3	15.0
Loose bodies	3	15.0
Disc space narrowing	6	30.0

Out of 6 cases of spondylolisthesis, 2 cases were grade I (33.2%), 3 cases were grade III (50%) and 1 case was grade IV (16.6%) (Table - IX).

Table - IX

Showing grading of spondylolisthesis.

Grade	No. of cases	Percentage
I	2	33.4
II	Nil	-
III	3	50.0
IV	1	16.6
Total	6	100.0

Out of 6 cases of Ankylosing spondylitis, 2 cases showing calcification of inter-spinous ligament (33.3%), and 4 cases showing syndesmophytes (66.7%) (Table - X).

Table - X

Showing Radiological sign of Ankylosing spondylitis.

Radiological sign	No.of cases	Percentage
Calcification of inter-spinous ligament	2	33.3
Syndesmophytes	4	66.6
Total	6	100.0

****

DISCUSSION

DISCUSSION

Age & Sex :

In the present study "Radiological assessment of low backache", the maximum incidence of low backache was found in females - 57.0 percent than males - 43.0 percent. The maximum age incidence of low backache was seen in the persons in their 5th decade of life.

Hult, L. in 1954 found that males ranging in the age group of 25 - 69 years were the most effected. His findings were attributed to 60 percent of male population.

Wood cites English studies carried out during the middle 1960's which suggest that low back pain was responsible for 2 percent of the patients visits to general practitioners, with an increase to 5 percent among the 50 - 59 years age group.

Cyriaxbery (1976) found 25 percent male population were having low back pain.

Nagi and associates (1973) carried out a study of social factors revealed that the incidence of low back pain was greater among females. For the entire group and for those over 30 years of age, the figures were 24 percent and 17 percent respectively. There was significant increase

with increasing age from 12.8 percent among those 18 - 34 years of age to 22.4 percent beginning at age 35 and remaining at the level to age 64.

Utilizing the data of Nagi and Te-Chuan Chen (Personal Communication, January 1979), it was possible to compute the prevalence of low back pain by sex and age group. In a general population of 65 million males and 70 million females aged 18 - 64, 53 million males and 34.3 million females were employed. In the 65 and over age group, only 2.5 percent of the 12 million males and 1.2 percent of the 18 million females were included in the work population. Among these groups, 14 percent of employed males and 21 percent of employed females 18 - 64 years of age, and 16 percent of employed males and 26 percent of employed females 65 years of age and older suffered from low back pain.

According to Dellance et al (1966) the most common age group having back pain in 50 and 60 years.

Occupation :

In the present study, the incidence of low back pain is higher among heavy working group (60%), followed by active (21%) and sedentary workers (19%).

In a study of 3,215 Israeli's working in eight different occupations, Magora (1970) found an incidence

of low back pain in about 19 percent of individuals who did heavy work (bus drivers, nurses, post office clerks and heavy industry workers) and an incidence of about 6 percent for those considered to be doing light work, for an overall average of about 13 percent.

Nagi and associates (1973) showed that among labourers, the incidence of low back pain was 22 percent, while among professional and managerial persons, it was 12 percent.

Vahrni (1975) showed the incidence of disc narrowing was 80 percent by age 55 among Swedish heavy labourers, 35 percent by the same age in office workers, while in a jungle population in India, the incidence at the same age was 9 percent.

From the studies carried out in England, Anderson (1976) cites numerous data on the incidence of low back pain in workers in various industrial occupations. One of these studies showed that among 2684 males employed as manual workers, 39 percent had a history of back pain.

Positive Radiological Findings :

In present series, only 79 percent showing radiological positive cases whereas 21 percent cases were normal.

The pain in 21 percent of cases were studied in present series and found that the cause of pain was due to using incorrect posture.

Kraus concluded that 80 percent pain is due to muscular dysfunction, while only 20 percent showing conclusive evidence of vertebral or disc pathology.

Pathological Causes

Osteo-arthritis :

In present study of chronic low back pain, osteo-arthritis was found in 20 percent of all cases. Out of total cases of osteo-arthritis, osteophytosis seen anteriorly in 80 percent of cases and posteriorly in 55 percent of cases. The reduction in height of vertebral body was found in 20 percent, subluxation was present in 20 percent. Marginal sclerosis was seen in 15 percent cases, 15 percent showing loose bodies whereas disc space narrowing was found in 30 percent of the cases.

Spondylosis begins in early middle age, the primary change occurs in inter-vertebral discs (Hadley, 1964).

Osteophytosis usually appears during the third decade, and by the time the average person is over 40 some degree of marginal osteophytosis is common. The location of osteophytes varies, most tending to develop

in the concave portions of the spine and in areas subject to strain. A wide range of calcification along the lateral and anterior aspects of the vertebral column is observed, from rather delicate bone bridges to deposits over a centimeter thick (Epstein, 1976).

Osteoporosis :

In present study, osteoporosis was found in 10 percent of cases.

Ishrant et al (1969) revealed that over one half of the woman 45 years of age and over had X-ray evidence of osteoporosis in the lumbar spine.

Lutwak and Whedon (1963) estimated that over four million people at the age 50 and above had osteoporosis of sufficient severity to cause vertebral fracture and consequent severe back pain.

In 6 cases of Dent and Friedman (1965), vertebral changes predominated including wedging and multiple compression fractures, widened inter-vertebral discs, with a biconvex configuration as well as loss of the normal bony trabecular pattern and then cortices. The thickness of the cortex of the long bones was markedly reduced with decreased strength and multiple fractures.

Old healed Pott's spine :

In present study, old healed Pott's spine was found in 9 percent cases.

Bosworth and Levine (1949) reported incidence of spinal tuberculosis to be 3.2 percent of a total of 12,835 tuberculous patients.

Loss of lumbar lordosos (due to muscle spasm) :

In present series, loss of lumbar lordosis was found in 7 percent of cases.

Kraus (1970) who studied 5000 patients in two New York hospitals presently with low back pain. He concluded that in 80 percent, the pain was due to muscular dysfunction.

Fahrni (1975) presented data to show that the erect posture used most of the day in western societies places a strain on the lumbar lordotic curve. According to his data, the loss of curve was 80 percent by age 55 among Swedish heavy labourers, 35 percent by the same age in office workers, while in a jungle population in India the incidence at the same age was 9 percent.

Prolapsed inter-vertebral disc :

In present series, the incidence of prolapse inter-vertebral disc was found in 7 percent of total cases.

Pheasant (1977) published the figures for entire state of California. Nearly one half of the patients were hospitalised with prolapsed disc or symptomatology indicative of disc diseases.

Aimon (1981) and his co-workers found prolapse of inter-vertebral in 80 percent cases which revealed signs suggestive of disc prolapse in one form or the other and in half of the cases, it was possible to predict the exact level accurately.

In 1930, Schmorl et al showed the pathologic lesion of the nuclear pulposus are frequently (38%) found in post mortem examination.

Spondylolisthesis :

In present series, spondylolisthesis is found in 6 percent of total cases. Out of 6 percent of spondylolisthesis,grade I spondylolisthesis was present in 33.4 percent; grade III was present in 50 percent and grade IV spondylolisthesis was shown by 16.6 percent cases.

Sayer (1982), Magora and Schwarts (1980) found spondylolisthesis in 2 - 3 percent of the general population.

George (1939) reported incidence of spondylolisthesis as about 3.5 percent.

Barley (1967) reported 5 percent incidence of spondylolisthesis.

Garland and Thomas (1946) found spondylolisthesis in as many as 10 percent of cases of low back pain in Army and Navy personnel.

John Henson et al (1987) reported that retrolisthesis at L_{4-5} occured in 44 percent, but no direct relationship was demonstrated between the extent of retrolisthesis and either the grade of spondylolisthesis or the presence of disc damage.

A group of 77 cases of vertebral retrolisthesis were encountered in 493 verified cases of lumbo-sacral disc protrusion by Gillespie (1951). In 35, the average backward displacement ranged from 0.3 cm to 0.9 cm and the majority had antero-posterior type of articular facet.

Ankylosing Spondylitis :

Six percent of the total cases were found as a case of ankylosing spondylitis in present study. Out of 6 percent of ankylosing spondylitis, calcification of inter-spinous ligament was seen in 33.3 percent and syndesmophytes was seen in 66.7 percent cases.

Forestier and Lagier (1971) reviewed the status of ankylosing spondylitis of the spine, a condition which occurs in middle aged and elderly people, but may appear in young adults as well.

Incidence of calcification of the posterior longitudinal ligament is slightly higher in males than in females (Onji et al, 1967). Hirematsu and Nobuchi (1971) reported 6 cases of women in their 8 cases.

Spina bifida :

Impairment of nerve function in spina bifida may be caused in some such cases by tethering of the dura, and through this the spinal cord, to the skin surface by a fibrous membrane. Traction on the cord becomes gradually worse as the spinal column elongates disproportionately to the spinal cord, so that the neurological deficit may be progressive (Adams, 1986).

In present study, spina bifida a congenital anomaly found in 4 percent of total cases.

Southworth and Bareaak (1950) reported spina bifida occulta in 18.2 percent of their study, in which 2.2 percent occured in the lumbar spine and 16.0 percent involved sacrum of the lumbar defects, only one was to the left of the midline.

Dittrich (1938) reported that 5 percent of all spines showing spina bifida occulta.

Brock, Hillsman and Bacon (1944) reported an incidence of 6 percent of spina bifida.

Fischer and Van Demark (1946) reported an incidence of 36 percent of spina bifida occulta in soldiers.

Old Traumatic Collapse :

In present study, old traumatic collapse was found in 3 percent positive complaints of low back pain.

Analysis of 150 referals to 'back pain clinic' revealed that there were 46 percent with a history of precipitating injury or short-term over indulgence in unaccustomed activity in association with their first attack (Anderson, J.A.D., 1978).

Wilson and Kate (1969) found only 1 in 250 cases of stress fractures in military trainees.

Osteomalacia :

In present study of low back pain, osteomalacia was found only 2 percent of all total cases. This was particularly in female patient only.

The evidence of osteomalacia occure in both with pseudo-fractures, vertebral softening and malformation and deformities of the extremities. In the cases described by Hunt et al (1966) they mention one patient 29 years old with failure of union of the vertebral ring epophyses in addition to the other sign.

Diastematomyelia :

Rarely, too, a bifida cord is transfixed by a delicate bar of bone crossing the spinal canal in the antero-posterior plane (diastematomyelia) with consequent tethering and progressive neurological impairment (Adams, 1986).

Diastematomyelia was found in 1 percent of total cases in present study.

Diastematomyelia is encountered in either sex from fetal life to old age. In most cases, there are pronounced associated anomalies of the vertebral bodies (Epstein, 1976).

Lumbar Canal Stenosis :

In present study, lumbar canal stenosis was found in 1 percent of total cases which was proved by myelography.

The incidence of spinal canal stenosis was observed in 10 percent cases by Sandhu et al (1976). They also concluded that spinal canal stenosis is more common in male and predominantly in the age group of 41 - 60 years.

Congenital vertebral fusion :

In present study, the congenital vertebral fusion was found in 1 percent cases of total cases.

Kaptain (1976) reported that the heights of congenital partially or completely fused vertebrae are of approximately proper proportions by measurement in some while in others an increase from 10 - 20 percent is present, the predominant increase occuring anteriorly.

Calve's disease :

In present study of chronic low backache, the incidence of Calve's disease was found in 1 percent of total cases.

Seven additional cases reported by Nugent et al (1959). Two were in adolescent and 1 had Scheuermann's disease.

Secondary deposit :

In present study, the secondary deposit was found in 1 percent of total cases.

Epstein (1976) reported the most common tumors, which account for more than 60 percent of spinal metastases, are from the breast, the prostate, lung, kidney, thyroid and colon.

Cohen et al (1964) reported that among tumors where spread is limited to a single vertebrae, the original neoplasm is from the breast, prostate, lung, kidney, thyroid and colon in over half of the patients.

xxxxxxx

CONCLUSION

CONCLUSION

In the light of the present work, the following can be concluded.

1. Of the 100 patients having complaints of chronic low backache attending O.P.D. of this hospital, the maximum age group were in their 5th decade of life (41 - 50 years, 60%).

2. The majority of cases were females (57%).

3. In both the sexes, the maximum occurence was in 41 - 50 years age group.

4. As per their physical activity, the hard working group was having more problem (60%).

5. The common symptoms of low backache, the stable type of pain was present in maximum cases (52%). Mild pain observed in most of the cases (56%). Maximum cases having complaints of pain more than one year (76%). Other symptoms were painful restriction of movement and few cases were having involvement of bowel and bladder, and lower limb also.

6. Out of 100 cases, only 79 cases showing some radiological sign. The rest of 21 percent were carried out detailed

history and it was found that their pain was either due to improper use of posture or their working condition causes them low back pain.

7. Maximum cases were found of osteo-arthritis (20%), followed by osteoporosis (10%).

8. Other common pathological causes were old healed Pott's spine (9%), loss of lumbar lordosis (7%), prolapsed inter-vertebral disc (7%), spondylolisthesis (6%) and ankylosing spondylitis (6%).

9. Congenital anomaly like spina bifida (4%), diastemato-mylia (1%) and congenital vertebral fusion (1%) were also a causative factor of low back pain.

10. One case of lumbar canal stenosis (1%) was found which was proved by myelography.

11. Osteomalacia was also found in 2 percent cases.

12. Old traumatic collapse were found in 3% of cases.

13. Calve's disease was found in 1 percent of cases.

14. One case (1%) showing secondary deposits in the spine.

From the above, it was concluded that chronic low back pain was a common problem in 5th decade of life particularly in females. Hard work causing more low back pain. The most common presenting symptoms were mild stable

type of low back pain. About one fifth cases showing no radiological finding and it was observed that improper use of posture causing low back pain to them. The commonest pathological condition causing low back pain was osteo-arthritis.

Besides this, the proper use of posture and mild to moderate degree of exercise can prevent such common problem of low back pain.

****

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SUMMARY

SUMMARY

Pain is the symptom for which most patients seek medical assistance. Since only the sufferer and not the observer perceives pain, it can have no precise definition. Sir Thomas Lewis described the situation exactly when he said that pain is "known to us by experience and described by illustration". Webster defines pain as the sensation one feels when hurt mentally or physically, especially distress, suffering, great anxiety, anguish, grief etc., as opposed to pleasure - or; a sensation of hurting or strong discomfort in some part of the body caused by an injury, disease, or functional disorder and transmitted through the nervous system".

The notion, that pathology of various vertebral column structures as the prevalent cause of low back pain, was challenged by Kraus (1970) who studied 3000 patients in two New York hospitals presenting with low back pain. He concluded that in 80 percent, the pain was due to muscular dysfunction while only 20 percent showed conclusive evidence of vertebral or disc pathology.

The chronic low backache is a very common problem all over the world. The present study "Chronic low back pain - an radiological assessment" was carried out to

evaluate the various causes of low back pain. Main aim of the study was to evaluate the various incidences and etiological factors of low back pain and its comparison to Western society. The study carried out in the Department of Radiology, M.L.B. Medical College & Associated Hospital, Jhansi. One hundred patients were selected from those attending the Out Patient Department of the hospital, having complaint of chronic low back pain. In the present study, cases included in age group 10 - 80 years.

The detailed history, duration of complaints, intensity of pain, its radiation, postural relation were noted. Detailed examination including general and local examination of lumbo-sacral spine was done. Routine blood and urine was done. Patients were subjected for radiological examination of lumbo-sacral spine. Plain X-ray of lumbo-sacral spine in antero-posterior, lateral and oblique projection were done. In few cases, contrast examination in the form of myelography was done.

In the light of the present work and with a view of studies in the past from literature, the following can be concluded.

On the 100 patients having complaints of chronic low backache attending O.P.D. of this hospital, the maximum age group were in their 5th decade of life (41 - 50 years)

60 percent. The majority of cases were females (57%). In both sexes, the maximum occurence was in 41 - 50 years age group.

Hult, L. in 1954 found that males ranging in the age group of 25 - 69 years were the most affected. His finding were attributed to 60 percent of male population.

As per their physical activity in present study, the hard working group was having more problem, 60 percent.

Nagora (1970) found an incidence of low back pain in about 19 percent of individuals who did heavy work and an incidence of about 6 percent for those considered to be doing light work, for an overall average of about 13 percent.

In our study, the common symptoms of low backache, the stable type of pain was present in maximum cases (52%). Mild pain observed in most of the cases (56%). Maximum cases having complaints of pain more than one year (76%). Other symptoms were painful restriction of movement and few cases were having involvement of bowel and bladder and lower limb also.

Out of 100 cases, only 79 cases showing some radiological sign. The rest of 21 percent were carried out detailed history and it was found that their pain was either due to improper use of posture or their working condition causes them, low back pain.

In present series, maximum cases were found of osteo-arthritis (20%) followed by osteoporosis (10%).

Ishrant et al (1969) revealed that over one half of the women 45 years of age and over had X-ray evidence of osteoporosis in the lumbar spine.

Other common pathological causes were old healed Pott's spine (9%), loss of lumbar lordosis (7%), prolapsed inter-vertebral disc (7%), spondylolisthesis (6%) and ankylosing spondylitis (6%).

Bosworth & Levine (1949) reported incidence of spinal tuberculosis to be 3.2 percent.

Kraus (1970) concluded that in 80 percent, the back pain was due to muscular dysfunction.

Pheasant (1977) published the figures for entire state of California, nearly one half of the patients were hospitalised with prolapsed disc, or symptomatology indicative of disc disease.

George (1939) reported incidence of spondylolisthesis as about 3.5 percent.

In present study, congenital anomaly like spina bifida (4%), diastematomylia (1%) and congenital vertebral fusion (1%) were also a causative factor of low back pain.

Dittrich (1938) reported that 5 percent of all spines showing spina bifida occulta.

One case of lumbar canal stenosis (1%) was found which was proved by myelography, in this series.

Sandhu et al (1976) observed spinal canal stenosis in 10 percent cases.

In our study, osteomalacia was found in 2 percent cases. Old traumatic collapse were found in 3 percent of cases.

Wilson and Katz (1969) found only 1 in 250 cases of stress fractures in military trainees.

In present series, Calve's disease was found in 1 percent and one percent showing secondary deposit in the spine.

Nugent et al (1959) reported seven additional cases, two were in adolescent and one had Scheuermann's disease.

Epstein (1976) reported the most common tumors which account for more than 60 percent of spinal metastasis, are from the breast, the prostate, lung, kidney, thyroid and colon.

From the above, it was concluded that chronic low back pain was a common problem in 5th decade of life particularly in females. Hard work causing more low

back pain. The most common presenting symptoms were mild stable type of low back pain. About one fifth cases showing no radiological finding and it was observed that improper use of posture causing low back pain to them. The commonest pathological condition causing low back pain was osteo-arthritis.

Besides this, the proper use of posture and mild to moderate degree of exercise can prevent such common problem of low back pain.

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